

MOTOR AGE

Vol. XXVII
No. 25

CHICAGO, JUNE 24, 1915

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JOHNSON'S PREPARED WAX

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Johnson's Prepared Wax is more than a polish—it also cleans, finishes and protects your car. It imparts a perfectly hard, dry, glasslike finish to which dust will not adhere. One of its greatest advantages is the fact that it

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DANN Insert is the **ONLY** shock absorber which is operative not at one only, but at **EVERY** point throughout the entire length and breadth of every leaf of all four springs.

DANN Oil Cushion Springs —with DANN Insert ready installed —can be furnished for any car. Write.

"The Inter-leaf Shock Absorber"

FROM TIP to TIP

DANN Insert is supplied ready packed in boxes for all makes and models of cars. Send for price list.

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Bear in mind that a spring vibrates **all over** — not only at one end, but at each end of each leaf. Vibration is just exactly as vigorous at the **rear ends** of the front springs as it is at the front ends of the front springs.

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And vibration is just as active at the front ends of the rear springs as it is at the rear ends of the rear springs, at which point so-called shock absorbing devices are attached in a futile attempt to relieve the **ENTIRE CAR** of road shocks.

Consider that your car's **SPRINGS** are primarily shock absorbers, and are put on your car expressly for shock absorbing purposes.

In order, however, that a spring serve its fundamental purpose of a shock absorber, it is vitally necessary that it be brought to and kept at its highest efficiency.

The installation of DANN Insert is the only means known for insuring and maintaining the highest shock absorbing efficiency of a spring throughout its entire life of service.

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2252 Indiana Avenue

Chicago, Ill.

TRANSCONTINENTAL STUTZ "BEAR CAT"



WORE

THE

Hartford

SHOCK ABSORBER

STUTZ MOTOR CAR COMPANY
INDIANAPOLIS



MAY
EIGHTEENTH
1915

Hartford Suspension Co.,
Jersey City, N. J.

Gentlemen:-

Having just completed my record breaking Coast-to-Coast trip in the Stutz "Bearcat" - setting up a new Trans-Continental auto record of 11 days, 7 hours and 15 minutes, breaking the previous record of six men driving by 4 hours and 55 minutes, I hasten to write you of the wonderful assistance rendered by the Hartford Shock Absorbers on this car.

I have driven innumerable cars, with, and without Hartford Shock Absorbers and have traveled and re-traveled many of the roads over which I had to pass in coming across the country, and while there is no question as to the ability of the Stutz Car, nevertheless, I am convinced that the Hartford Shock Absorber equipment materially assisted in this record.

It is impossible to drive a car and make speed without subjecting it to a great strain, and it would be hard to impose a tougher test on both the car and equipment than driving at high speed through Arizona and New Mexico.

My shock absorber equipment was perfect at the finish, and considering the remarkable performance of this device, and the fact that this record would not have been possible without Hartford Shock Absorbers, I cannot praise them too highly and I honestly think they should be a part of the regular equipment of every car, as they are of the "Stutz."

Very truly yours,

E. G. Baker

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When E. G. Baker smashed the ocean-to-ocean record for automobile travel, he performed a marvelous feat. The dash from San Diego, California, to New York City, took his sturdy Stutz "Bear Cat" over every kind of road conceivable.

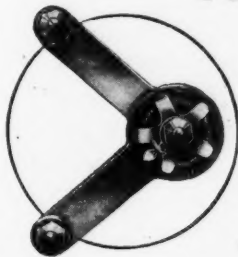
He came through in fine shape in the remarkable time of 11 days, 7 hours, 15 minutes, an average of 25 1/5 miles per hour for 3,728.4 miles, smashing all previous transcontinental records. He says:

"I am convinced that the

Hartford

SHOCK ABSORBER

equipment materially assisted in making this record"



His letter, in full is above. Here is further striking evidence that the Hartford Shock Absorber

"Makes All Roads Smooth Roads"

You, too, can travel anywhere at any speed, however rough the roads, with Hartford Shock Absorbers on your car. They stop jolting, jarring and vibration. Contribute to solid auto comfort. Prevent spring

breakage. Make tires last longer. Cut cost of maintenance. Insure longer life for your car.

Write us, advising make, model and year of car and we will tell you how to make it truly comfortable.

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President
MAKERS OF THE HARTFORD CUSHION SPRING, HARTFORD
ELECTRIC BRAKE, HARTFORD AUTO JACK, HARTFORD BUMPER

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The New Departure Double Row Ball Bearing stands alone among the world's best bearings, in that its ability to accept end thrusts and radial loads in combination, simplifies construction and makes a readjustment of motor car costs possible.

Then, too, you can get New Departure *Guaranteed* Ball Bearings in quantities—when you need them.

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MOTOR AGE



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BEWARE OF SOLICITORS, OFFERING SUBSCRIPTIONS AT OUT RATES.

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No. 25

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In next week's issue of Motor Age, the inaugural event of the new Chicago Speedway will be described, digested and illustrated from every angle.



Buy a SHANHOUSE Motor Suit

The best and cheapest investment you ever made

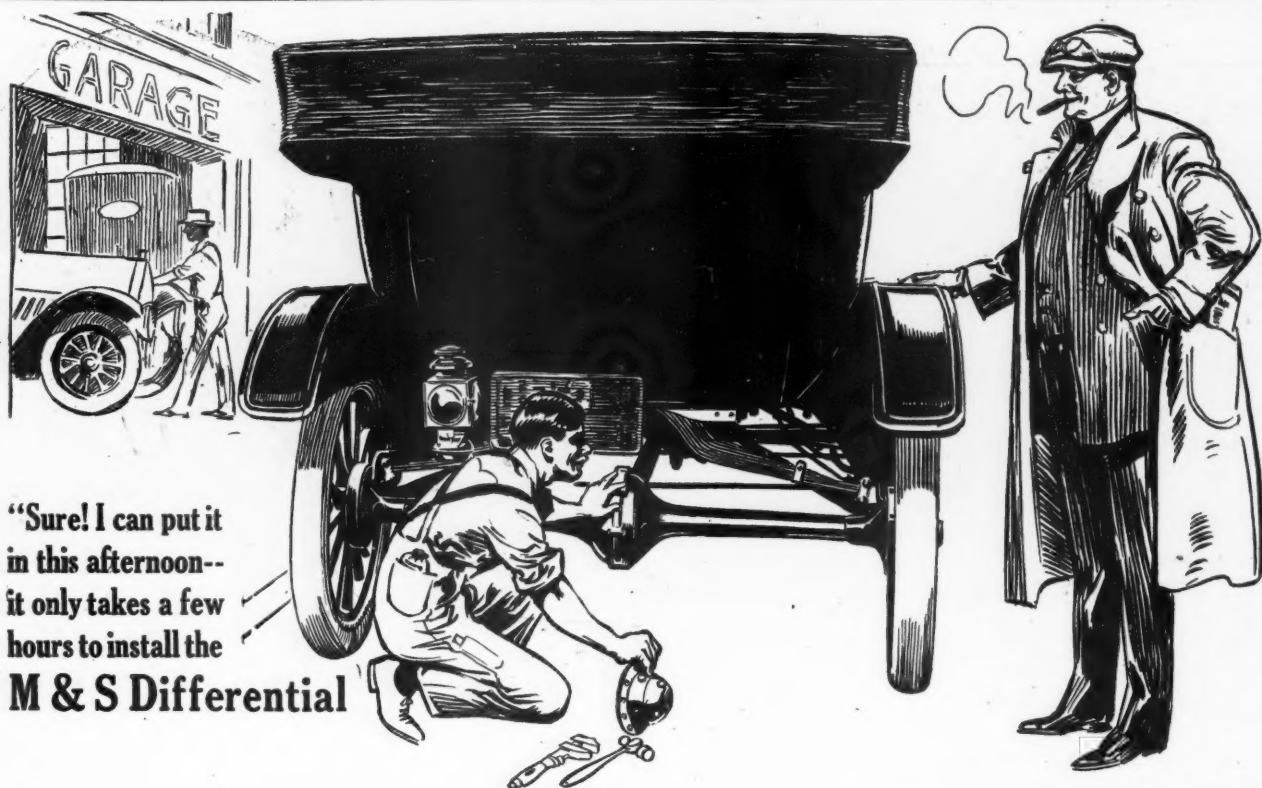
A Shanhouse Motor Suit protects your clothes from collar to shoe. It is a one-piece garment made of high-grade olive khaki—roomy and comfortable, easy to slip on or off. Carry it in your toolbox—takes up little room.

Every motorist should have one. Slip it on when cleaning or oiling your car; when on the road changing tires, and for many other uses. You can't afford to be without one.

Look for the Shanhouse label. It assures you that it is the Original Motorsuit. For sale by leading clothing and supply houses.

If your dealer doesn't carry it, send \$2.00 and we will send you one prepaid. Give chest measurement and leg length. Money back if not entirely satisfactory.

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Rockford, Illinois



**"Sure! I can put it
in this afternoon--
it only takes a few
hours to install the
M & S Differential"**

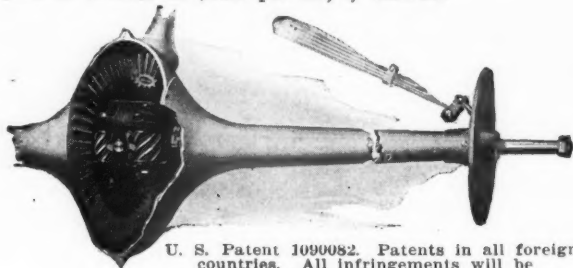
That's the reason Ford dealers and accessory houses are flooding us with orders for the M. & S. Differential—Special Type for Ford cars—fits in the Ford housing, using the regular ring and pinion gears. Think of it! The M. & S. Spiral Gear Differential at only a trifle more than the ordinary Ford Bevel Gear Differential.

Every Ford owner is glad to make the change after he has once driven a Ford equipped with the M. & S. We can furnish special 3½% nickel steel Ring and Pinion Gears—4 to 1 ratio at \$6.50 per set, if desired.

M & S

DIFFERENTIAL

Special Type for Ford Cars



U. S. Patent 1090082. Patents in all foreign countries. All infringements will be vigorously prosecuted.

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Made for us by the Brown-Lipe-Chapin Co. of Syracuse—the largest makers of differentials in the world—from the same nickel steel and embodying the same principle used in M. & S. Differentials for the high-priced, high-powered cars.

The M. & S. Marks the Biggest Advance in Automobile Building Since the Electric Starter.

The M. & S. Differential insures a positive and equal pull on both wheels at all times. If one wheel has traction and the other does not, the wheel without traction can revolve no faster than the one with traction. In other words, the M. & S. is really an automatic differential lock which operates when a lock is necessary, yet differentiates wheel traveling in turning corners.

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The M. & S. enables you to get out of any mud holes, sand or snow if one wheel has even the slightest traction. By insuring this positive and equal pull on both wheels, you save anywhere from 500 to 1000 miles' wear on the rear tires. You get more mileage to the gallon of fuel and you utilize all your engine power for work and not for idle spinning. The M. & S. transmits the power to the wheel or wheels having traction at all times, thereby minimizing the danger of wheel skidding and lessening the possibility of serious accidents due to loss of traction by the rear wheels.

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Every Ford owner is a prospect. Every demonstration practically means a sale. You have no competition and it's so easy to sell M. & S. Differentials to Ford owners that you can make more money with less expense and effort than you can make selling cars. The cost is only a trifle more than the regular Ford Bevel Gear Differential, yet the advantages of the M. & S. are so obvious that no Ford owner will be satisfied with his present differential when once he has driven a Ford equipped with an M. & S.

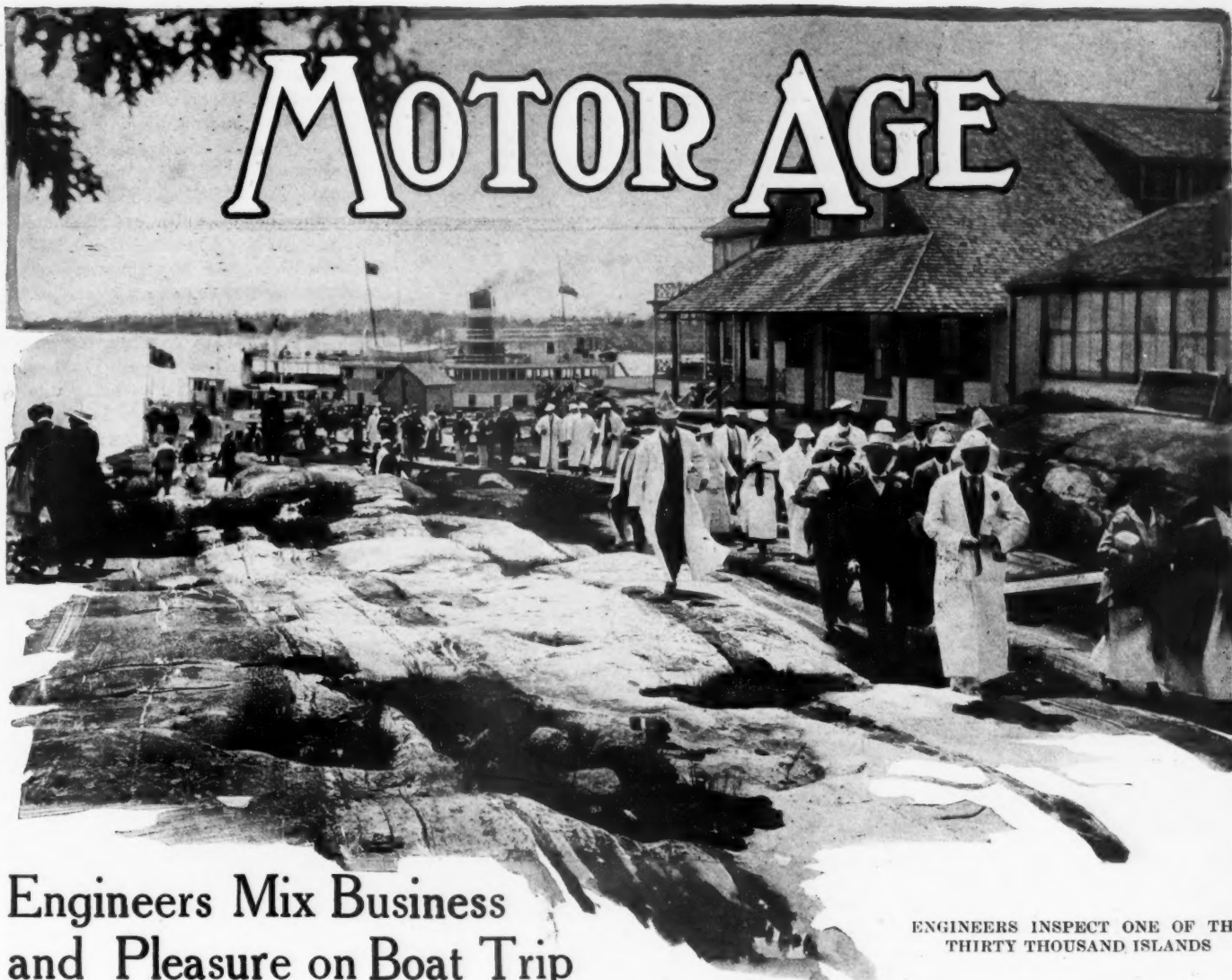
To Ford Dealers--- We want every Ford Dealer to install an M. & S. Differential in a Ford Car and then drive it in sand and mud and over slippery pavements. Send in the coupon and say you are a Ford Dealer and we will make you a liberal offer on a sample Differential for your Ford.

To any one financially able to handle large territory in a big money-making way, we have an exclusive proposition. It will pay you to investigate.

M & S GEAR CO., 1528 Grand Avenue, Kansas City, Mo.

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When Writing to Advertisers, Please Mention Motor Age



Engineers Mix Business and Pleasure on Boat Trip

ENGINEERS INSPECT ONE OF THE THIRTY THOUSAND ISLANDS

Members of S. A. E. Visit Georgian Bay and Discuss Weighty Topics en Voyage

DETROIT, Mich., June 17—This afternoon at 5 o'clock, promptly on schedule, the Noronic's gangplank was lowered at the dock in Detroit, and with the landing of the passengers, the annual summer session and cruise of the Society of Automobile Engineers was regrettably ended. Taking leave of the big ship was no easy matter, and the new friendships that had been formed and those that had been strengthened by the 4 very full days on the sparkling waters of the Great Lakes and among the Thirty Thousand Islands of Canada were further cemented by the good-byes and the handshakings as the Noronic swung in to her dock. It reminded one of the departure of passengers from a transatlantic liner.

VanDervoort's Hand at Helm

Everything went off without a hitch, and it speaks well for the manner in which the various arrangements committees did their work. No more able head could have been chosen than President W. H. VanDervoort, president of the Moline company, who presided over the business sessions in a tactful and firm manner, hold-

By Leslie V. Spencer



A CHANNEL THROUGH THE ISLANDS

ing speakers to the time limits, and so running things that every paper and report scheduled was presented. In fact, there was one additional that had not been on the program.

The meetings were exceedingly well attended and the papers were all on topics of special interest, not alone to the industry, but to the motoring public at large. There was a marked tendency to be frank in the discussions, and commercialism was entirely eliminated. Viewed from the standpoints of amount of business done, of recreation and of amusement, the cruise was eminently successful.

Talk Twelves and Eights

Summarizing the papers presented, several topics stand out as being especially important and pertinent at this time. Brought on by a paper on "Engine Design," by A. P. Brush, of the Brush Engineering Co., the whole subject of number of cylinders was given a good airing. There was a surprising lack of conviction in the remarks of the speakers, who in most cases professed not to know just what would be the end of the multi-cylinder



S. A. E. PICNIC ON SAN SOUCL, ONE OF THE THIRTY THOUSAND

movement. Spiral-bevel gears for rear axles were considered at length and in a frank manner, a most enlightening array of information on aluminum pistons was given. There was no tendency to discourage their use. Farm tractors also were recognized as a new and growing part of the society's work, and a large number of engineers listened to words of wisdom about them with no end of interest. The design of springs was taken up from a new angle, and motor car lubrication was dealt with and the results of an oil refiner's long investigation given to the society.

The Noronic, with her cargo of about 450 members and guests of the society and wives and daughters, left Detroit on Monday, June 14, amid the shrieking of horns, the waving of farewells from friends and acquaintances and stirring airs by the Packard band.

Begin Business Early

The day was beautiful, and it resolved itself into a general renewing of old friendships and making new acquaintances. The steamer was not far up the river before the first session of the engineers was begun, and it lasted until nearly dinner time. The Noronic was not to stop until she reached Midland, Ont., a 24-hour run from Detroit. Up through the picturesque Detroit river and on the north side of Belle Isle she made her way, continuing on into Lake St. Clair and then through the St. Clair river into Lake Huron. It is a beautiful day trip through these rivers,



READY FOR DANCING CONTEST IN SALOON OF NORONIC

and the scenery is ever changing. There were no end of salutes from the time the big boat left Detroit until she got well into Lake Huron.

Along towards nightfall the lake became foggy and the night run was slowed up on that account. In the morning, the cruisers found themselves 5 hours late. So, instead of arriving at the first stop as scheduled at 2 p. m., Tuesday, the ship did not dock until nearly evening, having made up some of the time. It had been planned to take the trip through the Thirty Thousand Islands that afternoon, but the program was changed, the Noronic staying at Midland all night.

Open Town to Engineers

That little town was ready for the voyagers, and it seemed as if every one of the 1,500 inhabitants was either at the dock or on the way there. Flags were everywhere, and even before the gangplank was low-

ered the mayor had jumped aboard and assured the tourists that the town was theirs.

It soon became evident that the town was theirs. Postcard emporiums, dry goods shops, variety stores were raided and a miscellaneous collection of noise-producing instruments was commandeered. Half an hour after the ship landed, the excitement was intense, and Midland was treated to a circus, the like of which even the oldest inhabitant had never seen. Up and down the main street the Metropolitan section paraded in white coats and with the assistance of the band. Delivery wagons, express trucks drawn by antedeluvian horses and riding nags were requisitioned, and while the tin horns and pans were made to give out their most discordant noises, these outfits were driven up and down the main street.

Car Makers Forget Dignity

It was a memorable sight to watch some of the most sedate figures in the industry dressed in kimono and other women's apparel performing for the edification of the townspeople and the other members of the

party. Even a movie theatre was bought out and a show of their own was put on by some of the funmakers. No less a figure than David Graham, accompanied by George Walker, both dressed as darkies, demonstrated the merits of a washing machine in the window of a tiny hardware store to the delight of that portion of the populace that could get near enough to see it.

In the evening the revelry calmed down somewhat and all were aboard the ship early for a good night's rest, as the small steamers Waubie and City Queen were to leave at 8:30 next morning for the trip through the islands. There were too many to all go on the Waubie, the larger of the two island steamers, so the Metropolitan section chose to go on the smaller boat.

The trip through the islands long will be remembered. The day was ideal, and the water seemed but a fitting setting for

the innumerable tiny bits of land that protruded through its mirror surface. Winding in and out among them, the steamers almost touched some as they were passed. It often appeared as if the boats would run headlong into an island just ahead, but when it was reached, a right-angled turn would solve the puzzle of where the channel was, and a new vista would spread before the party.

At about noon time, the party was landed at a pretty island appropriately named Sans Souci. Before going ashore, each was given a lunch box, and then several hours more of merriment were spent picnicking and playing games. Many took advantage of the boating and rowed or canoed on the clear waters. Finally the party took leave of this island for the last part of the island trip to Parry Sound, which was reached at about 4 p. m.

The entertainment features were not confined to the stops at the towns or the island trip, for there was plenty of amusement on board ship. Dancing was quite

war business. Gee Onecent, of the Porkyard Motor Car Co.; L. M. Puncher, of the Fedora Truck Co.; Al. Rooker, of the Locodobile Co., and Geo. Willing, of the Garter Truck Co., were saved from deep humiliation by Detective Bevel-Drive Pete.

Following this, a clever impersonation of busts of past presidents of the society was given, and take-offs on the presidential addresses which they had given on the occasion of previous meetings of the society were read.

Followed by a Minstrel Show

The next evening, the Detroit section put on a very laughable minstrel show. K. W. Zimmerschied, of the General Motors Co., and W. H. Conant, of the Gould Storage Battery Co., were the end men, and W. A. Brush was interlocutor. W. T. Coholan proved a good Scotchman; W. B. Stout, chief engineer Scripps-Booth Co., did some clever Swede stuff and whistled; B. G. Koether, sales manager Hyatt Roller Bearing Co., showed that he is a master of the violin, and real minstrels have nothing

on the end men. More clever stories were emitted by other members of the Detroit branch, and several clever parodies on popular songs made the audience scream. It was enough to make Lew Dockstader green with envy.

President's Address

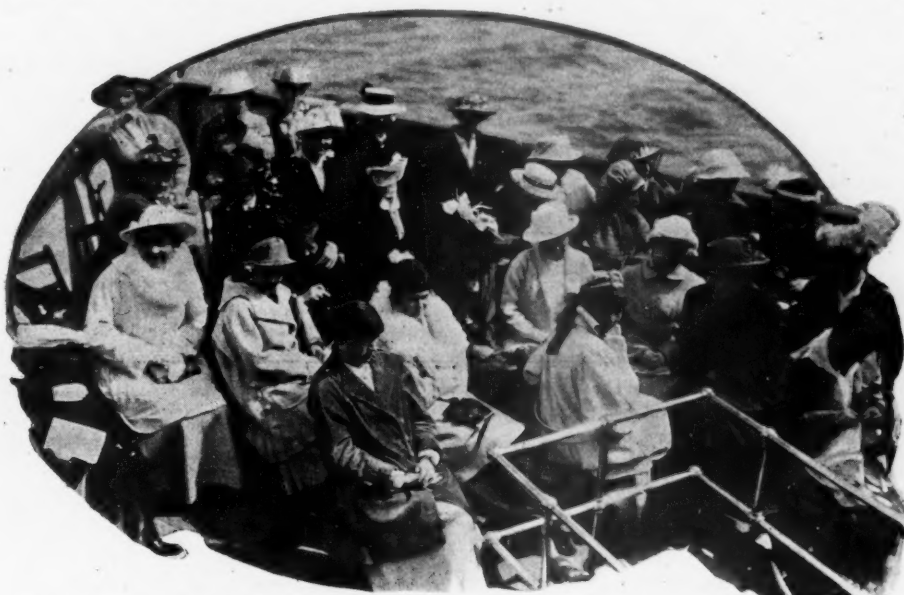
The address by President W. H. Vandervoort opened the convention, and its keynote was a plea for society advancement through the most thorough application to the solution of the problems which confront it, and the most careful scrutiny of the eligibility of applicants for membership.

Speaking of the development of the industry, he stated that it had grown to marvelous proportions in a day. The prophecy that carriages without horses would go has been a true one. It has brought about changes in the mode of life. The countryman no longer is isolated and the business man finds more time to devote to his business through the increased speeds of getting about by automobile.

The Society of Automobile Engineers will advance to great prominence among organizations of its kind, President Vandervoort prophesied. It should aim to have a strong engineering membership, and to maintain such a high standard of quality that membership in it will be an asset. This can be brought about by careful scrutiny of the applicants.

Care must be used to guard against commercialism, the president said further. There is disaster in tolerating it, and the society must be broad in its treatment of ideas. Speaking of the membership, it was pointed out that last year conditions in the industry were such that a number of members were lost. For inability to pay dues and for other reasons, eight were dropped in February, but at the present time the loss is only four more than the gain and there are still a number to be passed upon.

Contrasting former manufacturing policies with those of today, President Vandervoort stated that the idea formerly was to produce



FEMININE CONTINGENT ON DECK OF NORONIC

popular whenever the observation cabin was not being used for a session, and on the last afternoon out a contest was staged, with Miss Polly Souther, daughter of Henry Souther, and John W. Watson, the winners. The prize was a year's possession of a 3-year cup and a free ticket for the next cruise of the society.

Stage a Burlesque

On Tuesday evening, following the professional session, the Metropolitan section gave its entertainment, which consisted of a playlet entitled the "Sad Mystery of the Wiggle Drive." David Brownsky, supposed foreign purchasing agent for the allies, and who later proved to be the secret agent of the Simkins-Detroit Exile Co., succeeded in making representatives of several truck companies admit that they would do anything—even to the adoption of the wiggle drive—to get a chunk of the



STEAMER NORONIC, ON WHICH S. A. E. HELD ITS SUMMER MEETING



ENGINEERS AND THEIR WIVES AND DAUGHTERS POSE AT MIDLAND, ONTARIO

Copyright, 1915, by Spooner & Wells, Detroit

the greatest reliability with cost considerations only secondary. Now the cost considerations are paramount without any of the reliability being sacrificed. The highly systematized work of today has made it possible to bring down cost.

The business will not get into a rut quickly. Progress is being made too rapidly for that and we can't predict what the universal car will be at the present time. It might be a four or a twenty-four. Dare we predict what we will give the public in 1925?

The report of Treasurer A. B. Cumner shows the society to be in excellent financial condition at this time. The cash balance on hand at the close of the fiscal year, May 31, 1915, amounted to \$13,309. The National Automobile Chamber of Commerce has again pledged \$3,500 to be given to the S. A. E. for the furtherance of its work, also.

One hundred and five new members have been added to the society, besides which there are a large number still to be approved by the council. Of these, twenty-seven are full members, twenty-three associates, twelve juniors, five affiliates and thirty-eight student enrollments.

Plans for Winter

The closing of the convention was marked by several important points, in addition to the love feast which expressed thanks to all who helped to make the trip so enjoyable and profitable. The president mentioned that the winter meeting, which will be held in connection with the New York show, will be for 1 day only. The Standards committee will meet on the Wednesday of show week, and the session will take place all day Thursday, with a dinner at a prominent hotel in the evening. It is hoped to have a very full attendance, with no stringing out of business, as sometimes has been the case.

As on former conventions, a lively little newspaper was published on the boat. It came out morning and evening and was known as the Daily SAE. Clever hits on prominent voyagers, ads that contained a

laugh in every line and jokes on everything imaginable were in its four pages. The latest news of the world was published through courtesy of the Detroit Free Press and the Goodyear Tire and Rubber Co.'s wireless system. To the tireless efforts of the Daily SAE editorial staff is due a great deal of the fun of the trip. The managing

editor was J. C. Weed; C. M. Steele, city editor; J. G. Roe, news editor; Henry Ewald, country editor; W. B. Stout, motor car editor; T. M. Neilson, art editor; F. Ed. Spooner, sport editor, and J. C. Hussey, chief of mechanical department. All advertising was guaranteed unreliable and fraudulent.

Some of the Papers and Discussions

Eights and Twelves, Tractors, Tires, Aluminum Pistons Among Subjects

THE paper on the "Fundamental Problems of Engine Design," by A. P. Brush, Brush Engineering Assn., while it did not deal with the question of how many cylinders the future motor will have, nevertheless brought up that question, which is interesting the public as well as the engineers at this time. Just how far the increasing of the number of cylinders will go, and the reasons for the coming of the so-called multi-cylinder engine are points which are not exactly clear to any of the engineering fraternity.

A rapid-fire discussion took place on these questions, and quite naturally makers of eights and twelves put up their arguments against those of the men who have not yet entered into the making of anything above a six.

C. T. Myers, engineer of the Timken-David Brown company, said that he believes the four-cylinder motor to be capable of higher development than any other type.

Victor Page in a contributed written discussion of the paper stated that the big objection against the multi-cylinder engine is in its added repair expense. It is his belief that the number of cylinders justified to secure easy running should be used, but after that number is reached, the designer should endeavor to make things as easy for the operator of the car or the ultimate consumer as possible.

D. McCall White, Cadillac engineer, said that an eight must be of the highest type of construction to be a success. In manufacture great attention must be given to minute details and hence the eight to be correct is expensive to manufacture. He expressed himself as deprecating the rush toward the cheaper eights and also stated that the maximum efficiency was not to be had from the six or twelve. As regards quietness he said that this quality would be best found in the L-head motor.

"Behind the cylinder question there are sev-

eral fundamentals to be taken into consideration," said Howard Coffin, Hudson company. "Does a concern expect to charge the public for the work on the multi-cylinder car or give the best value for the money?" Mr. Coffin then went on to mention how certain exhibits at recent shows were so hurriedly put together that the pistons were not even in the cylinders. He then cited an article which recently appeared in The Automobile where it was stated that the question is not so much how many cylinders as what should be the size of the individual cylinder. He stated it as his belief that the best displacement per cylinder would be from 40 to 50 cubic inches. From this premise he drew the conclusion that if the piston displacement of the motor was 300 or greater it would be better to break it up into a larger number of cylinders. "But," he said, "we believe that if the piston displacement is less than 300 cubic inches it should not be broken up into more than six cylinders."

"Regarding the motors with a greater number of cylinders than six," said Howard Marmon, "after going at any speed the purchaser will not know if the motor is a six, eight or twelve. Muffler vibrations are set up even in a six and this is one of the difficulties which may confront the twelve.

"The valve in head motor is easier to cool than the L-head or the T-head and valve location gives a smoother flow to the inlet gases. Our experience also teaches us that the cross vibrations are more pronounced with the eight than they are with the four."

George Dunham, consulting engineer, believes that the best car is the one from which the ultimate consumer will secure the best results. The things which sell a car are first, appearance which attracts the interest of the intending purchaser, and second, performance which makes him decide. Assuming this contention the motor which gives the best performance would be best.

Russell Huff, consulting engineer of the Packard company, asked: "Why are we all studying the multi-cylinder type of engine and discussing its merits? Asking myself this it came to me that the problem should be studied by first making the car and then studying its performance. Packard has studied cars for fast cross-country running. We cannot make that type of car under 4,500 pounds, even with the best of material, and with this weight a good-sized motor must be used. We have come to the conclusion that 35 to 40 cubic inches piston displacement to a cylinder is the most practical limit. You

need 410 to 425 cubic inches to handle the type of car that I have described.

"The public has demanded smoothness. People do not like to shift gears and this has driven us to study the multi-cylinder type and we have learned many things. The question of reducing the weights of the reciprocating parts should be given great attention. By using the light-weight piston we have made a big cut in the weight on this new twelve and in the connecting-rods a similar reduction has taken place. This has enabled us to make vibration practically nothing while on our six-cylinder car at certain speeds there was a vibration. We are now using gear reductions of 4.375 to 1 for fairly level country and 4.75 to 1 for the hillier country and with the new type of car find that we can get 99 per cent travel without gear changing."

Motor Car Lubrication

Oil was refined in a model refinery by C. W. Stratford, engineer Platt & Washburn Refining Co., who gave a paper on "Automobile Lubrication." He says that the maximum mileage per gallon of oil in the best modern motor car motor is rarely above 1,000, as compared to the average motor which probably never exceeds 200. Tight piston rings, large centrifugal rings on the crankshaft where it passes through the case, ample cooling fins in the pistons, vents between the crankcase chamber and the valve enclosures, etc., are given as the reasons for the greater oil economy of the one over the other. It is simply a matter of properly caring for the cooling of the oil and prevention of leakage.

Faulty piston rings are not to be tolerated, says Mr. Stratford, any more than is their careless fitting. Concentric rings are to be preferred with a maximum clearance between back of ring and bottom of groove of 0.01 inch. The cooling of oil in the sump can be accomplished most effectively by radiating fins on its outer surface.

Mr. Stratford says the force-feed lubricating system is the best. That is, a circulating system with feed under pump pressure to all crank and camshaft bearings.

"The term 'non-carbon' frequently used in the oil trade, obviously for the purpose of misleading the buying public, is not only a misnomer, but a statement contrary to chemical fact. Lubricating oils are hydro-carbons and, as their name indicates, consist of a physical mixture of different chemical compounds of the element carbon and the element hydrogen. No other elements are present except as impurities. Just as cream, butter, cheese and other products are derived from milk, so are hundreds of different hydro-carbon compounds, lying between the extreme limits of gasoline and cylinder stocks or coke, separated from crude oil. Each one of these many compounds has its own peculiar physical properties, such as definite boiling point, etc. American motor oils are manufactured from paraffin, asphaltic, and mixed paraffin and asphaltic base crude oils."

H. L. Connell, Central Continuation School,

asked regarding oil filters on motors. Mr. Stratford said he has had no experience with oil regeneration, but it is surprising how the color can be brought back by passing through waste, he said. He approves of a settling basin rather than filtration within the engine.

Henry Souther spoke for the coöperation between the refiner and the user as typified by Mr. Stratford's telling of his experience, he being a refiner. In the old days all was mystery; now we are getting something worth while. But he cautioned against laying everything to lubricating oils as being the cause of all ills. There must be some give and take.

Mr. Myers questioned as to what had been learned of effects of good and bad carburetion on carbonization. Mr. Stratford said that it is very difficult to determine the amount of carbonization from a poor mixture. Rich mixtures show big increases in carbon deposit, and it may vary from less than 1 per cent to as high as 75 per cent, depending upon how much of the time the explosions are in full throttle opening.

So sound were the arguments put forth in the paper by P. W. Litchfield, factory manager of the Goodyear company, on the "Size and Inflation of Pneumatic Tires," that little room was left for discussion. He attacks the practice of overloading, shows what the results of such are, and claims that only a small percentage of the American cars are properly tired from the standpoint of economy to the car owner. Fully a third of all motor cars have their tires overloaded to such an extent that serious tire trouble and expense are inevitable.

Size and Inflation of Pneumatic Tires

Mr. Litchfield attacks the overloading practice in part, as follows:

The pernicious practice of overloading affects not the car owner and tire manufacturer alone, but hits back at the car manufacturer as well. When the car manufacturer puts out a car with tires too small, he first of all inflicts needless tire trouble and expense on the purchaser, out of all proportion to the insignificant saving in the initial equipment. In one rather ordinary case which we have worked out in detail, the car manufacturer, by spending only \$14.40 more for tires $\frac{1}{2}$ inch larger in section, can save his customer 146 per cent on the added investment in 1 year. It is impossible for him to dodge this responsibility indefinitely. The general public is coming to realize the truth of the matter, and is even now inquiring more deeply into such details. But tire trouble and tire expense are not the only things to consider. As soon as a car owner finds that he is getting poor tire mileage, his first recourse is naturally to increase the inflation pressure too much. The direct result of this is undue wear-and-tear on the car, loose connections, motor trouble, leaks, etc., soon developing.

Both the car manufacturers and the tire manufacturers are to blame for the existing conditions. The car manufacturer says, "I'll buy the smallest tires that are guaranteed to carry the weight of the car." The tire manufacturer says, "I'll guarantee these tires if they are pumped up to the pressure necessary to carry the load and then advise the consumer to change to larger tires if he wants more economical equipment." Why not treat the qualities of comfort and easy riding with fair respect and recognize them as vital points, just as much as tire durability? Why does a man use pneumatic tire at all if not for easy riding qualities? What is the use then of pumping up an undersize tire so hard that it shakes the car to pieces, and seriously discomforts the passengers?

What is needed is a better coöperation. 1

believe the time has come when this can be had very effectively, if we will only appreciate the true conditions, and make a sincere attempt to improve them. Before taking up directly the subject of proper size and inflation we must first get some idea of how these elements vary one with the other and how they affect the various items of tire performance.

Trucks for Military Use

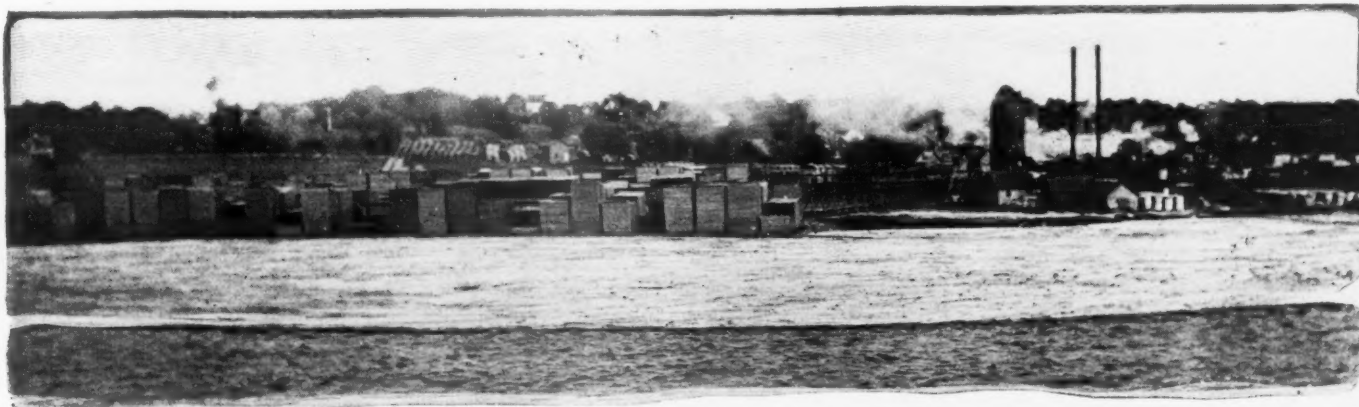
The successful army motor truck, aside from its chassis design, has been found to require the following four features, according to experience at the front: 1, good clearance; 2, a strong hook in front and rear for towing purposes; 3, sprags to hold the vehicle on steep, slippery grades; 4, quickly-applied, non-skid chains. These are cited by Jerry W. DeCou, in his paper on "Type of Motor Truck for Military Use."

The U. S. army officers define the ideal army truck as a truck which will go anywhere a four-mule team will go. Two months after the war began it was discovered that the ordinary motor truck was not suited in all its features to the exacting conditions of military service, says Mr. De Cou. It was learned that a four-speed gearset, differential lock, relatively small high-speed engine, large and easily filled gasoline tank, interchangeable carburetor and magneto, drain cocks on the radiator and on the water jackets of the engine, and other points were very desirable. He goes on to say:

"In the army transportation service in the European war, at least on the western front, there are two different phases: 1. Transportation on good roads up to within a few miles of the firing line. 2. Transportation on bad roads in the territory traversed several times by the opposing armies and more or less badly rutted by thousands of vehicles and possibly damaged by artillery fire. There is also a fair amount of transportation across fields and open country to the firing line. The first kind of transportation, over good roads, is little, if any, different from the haulage in the commercial world in times of peace; so this phase of the subject can be dismissed. It is on the bad roads, damaged by heavy vehicles of all kinds and sometimes by shell fire, that most of the troubles of motor trucks in the war have occurred. Vehicles of English manufacture, which on the beautiful roads and boulevards of London averaged anywhere from 20,000 to 60,000 miles on their original tires, have needed new tires after from 2,000 to 4,000 miles of travel near the army depots near the front."

Pressed Steel Wheels for Passenger Cars

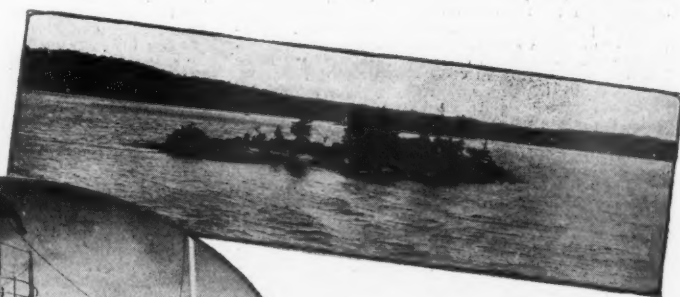
In taking up the subject of "Pressed Steel Wheels for Pleasure Cars," Orrel A. Parker, manager of the wheel department of the Hydraulic Pressed Steel Co., deals chiefly with wheel tests covering a period of 4 months, conducted by the Case School of Applied Science, Cleveland, and which go to show that it is possible to make a



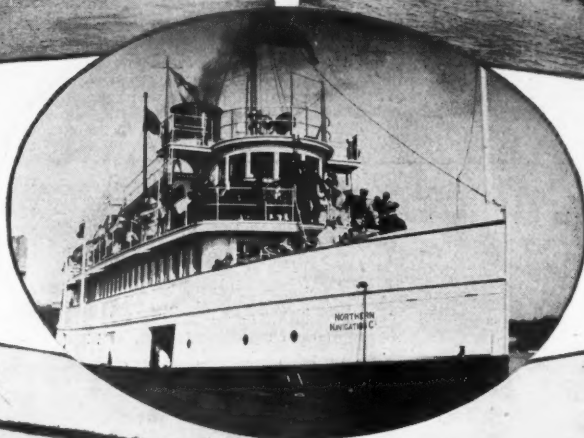
MIDLAND, ONT., A TYPICAL LUMBER TOWN IN GEORGIAN BAY VISITED BY ENGINEERS



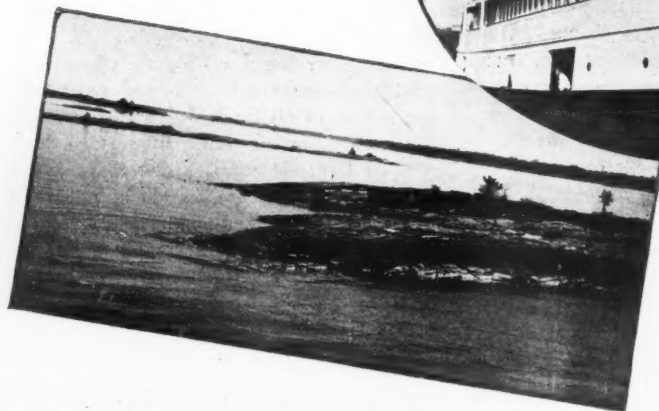
*St. Clair Canal in the middle of
Lake St. Clair*



*One of the islets that make up the
Thirty Thousand Islands*



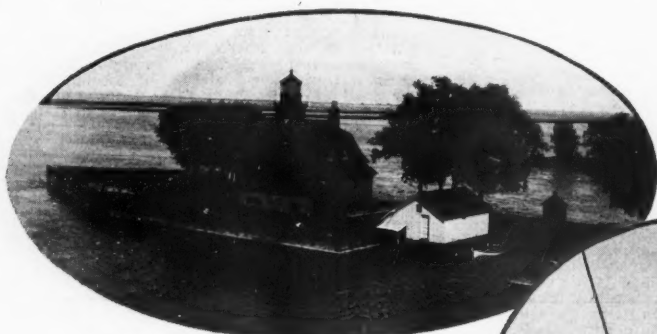
*The Waubic, one of the two
boats used by the engineers in
their trip through the Thirty
Thousand Islands.*



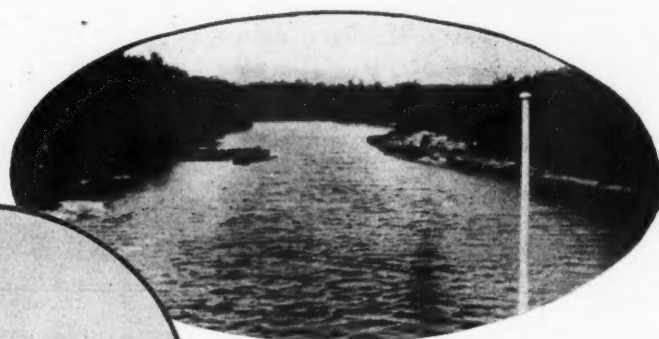
*Panorama of some of the islands of the
30,000.*



Whalebacks in Lake St. Clair

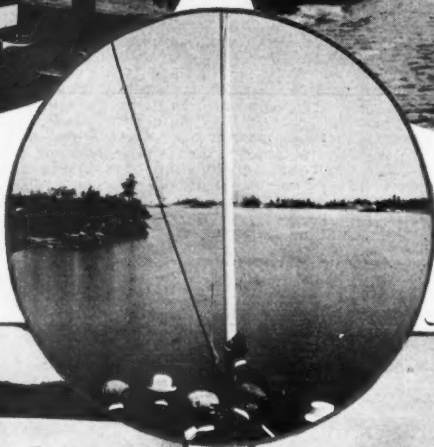


Upper end of St. Clair Canal

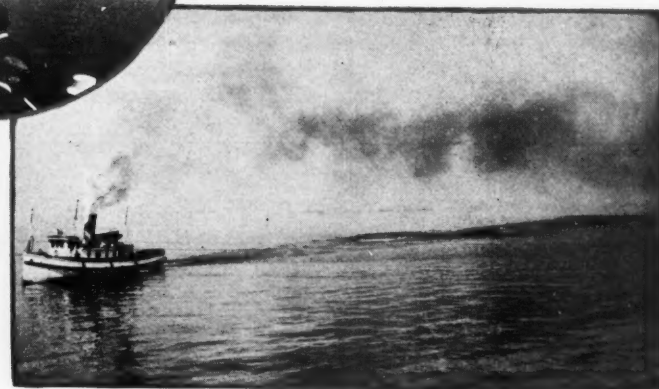


St. Clair Flats in Lake St. Clair

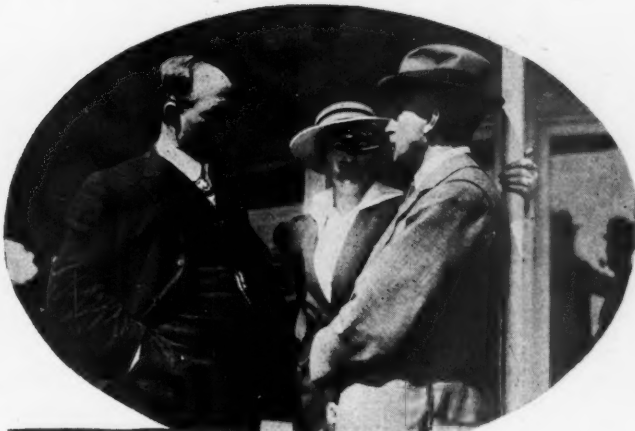
*Narrow channel between the islands in
Georgian Bay*



Viewing Georgian Bay from the bow



Towing lumber raft to mill in Georgian Bay



President W. H. VanDervoort of the Society of Automobile Engineers, president and general manager, Moline Automobile Co.; Mrs. VanDervoort



C. W. McKinley, chief engineer, Willys - Overland Co.



Howard Marmon, chief engineer, Nordyke & Marmon Co.



Russell Huff, consulting engineer, Packard Motor Car Co.



Howard Coffin, vice-president, Hudson Motor Car Co.



D. McCall White, designer of the eight-cylinder Cadillac; Mrs. White



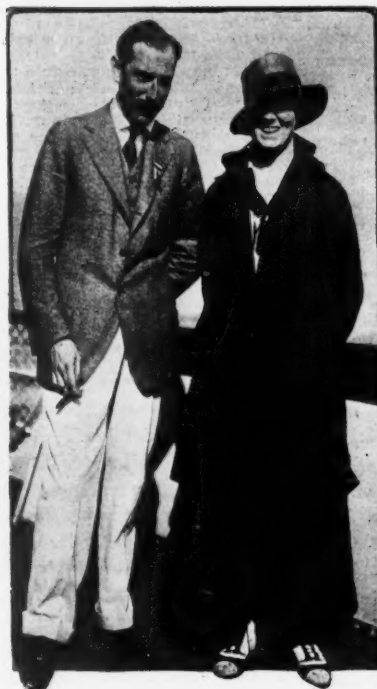
William B. Stout, chief engineer, Scripps - Booth Co.



David Fergusson, chief engineer, Pierce - Arrow Motor Car Co.



A. P. Brush, consulting engineer, who started the discussion on eights and twelves



Winners of dancing contest, John W. Watson, president American Bronze Co., and Polly Souther, daughter of Henry Souther, ex-president S. A. E.

G. P. Dorris, vice - president, Dorris Motor Car Co.





PROFESSIONAL SESSION OF S. A. E. IN SALOON OF NORONIC

pressed steel wheel weighing only 53 per cent as much as the usual wood wheel and its metal parts, and yet slightly stronger.

Aluminum Alloy Pistons

Aluminum alloy pistons were discussed at some length, as the result of a paper by Eugene Gruenewald, engineer of the Moline Automobile Co. In reviewing the situation of this kind of pistons, he says:

The reduction in weight of reciprocating parts is of the greatest importance in the high-speed automobile engine practice, and it is the first aim of the designer to reduce the weight of the pistons. Many means to do this have been employed, but it has been found that commercially the aluminum alloy is the most suitable material for the purpose. The weight of the finished alloy piston is practically one-third of that of the gray iron piston.

Engines equipped with aluminum pistons have been in service for many thousand miles without the least sign of loose bearings. The accumulation of carbon on the piston head is reduced, on account of the cooling effect of the aluminum. The poppet-valve motor equipped with aluminum pistons can be kept in service for a greater length of time before it is necessary to remove the carbon than if equipped with cast-iron pistons.

Aluminum alloy piston wears excellently with the usual lubrication. One set of pistons which has been under observation has shown a quarter of a thousandth wear after 14,000 miles of average work. Naturally, the cylinder walls are less affected, as the aluminum alloy is much softer than cast iron. The ring grooves did not show any wear, and only one piston-pin hole indicated a loose pin. The record of wear as a whole is at least as good as can be found for cast-iron pistons.

The disadvantage of the aluminum alloy piston is its greater expansion, necessitating greater clearance which must be determined very carefully as stated. It will be noticed that a motor equipped with aluminum alloy pistons has a light piston-slap during the first few explosions, but after the temperature of the pistons has risen they are as quiet as cast-iron pistons. The weight reduction has, of course, a quieting effect on the whole engine.

E. S. Fretz, Light Mfg. and Foundry Co., gave three conditions for success with aluminum alloy pistons. These are: first, engineering must take care of greater expansion and contraction; second, the mixture, and third, the foundry practice. He believes the best results to come from an aluminum with 4 to 6 per cent magnesium content. In Europe, the usual practice is to have an alloy composed of 90 per cent aluminum, 7 per cent copper and 3 per cent zinc.

"In considering the problem of spring suspension," says C. H. Gleason, designing engineer Kalamazoo Spring and Axle Co., in his paper on Spring Design,

"certain general details have an important bearing, as follows:

1. Weight of car; 2. load to be carried; 3. speed at which the car is run; 4. wheelbase. Every car must be designed to meet the worst conditions that may be imposed on it. While these conditions may be only momentary, or during a limited period, if the car fails, all else will be forgotten. A light car requires different treatment than a limousine, the lighter car being often the harder to handle. In either case, however, the load to be carried by the springs is the first determining factor.

He says that the reaction of a spring is determined by its length and is approximately uniform, and that the shape has as much to do with the reaction as any other factor.

Spring Design

Other points brought out are:

In three-quarter elliptic and platform springs, the front portion of the spring should have a deflection equal to the deflection of the two rear portions combined.

A spring is at its best when it is horizontal and the master plate is straight. It will take the shocks of the road better, will be found steadier, its action will be lazier, and the car will pitch less.

Nothing is gained by using a narrow spring. Within reasonable limits the wider the spring the more steadily and more satisfactorily the car will take the road.

It is manifestly impossible to deal with spring design in other than general terms. It is unfortunate for the car designer and the spring-maker as well that this is so. While the method of procedure may be simple and clear, the possible combinations are so many and the divergence of views is so great that it is necessary to consider each car individually to even approximate ideal results.

Henry Hess, Hess Steel Co., has long been investigating spring design and has had ideals of what a spring should be, he said, gained through experience as a rider in cars. The desirable things in a spring, in Mr. Hess' mind, are that it should be exceedingly responsive to very small shock, and that it have the amount of allowable deflection under load.

The main point Mr. Hess sought to bring out was that a spring should be designed to produce no shock. Shock, he explained, is due to a second vibration coming on at the apex of the previous wave, thereby having a cumulative effect. That spring is best which has a characteristic such that there is only a single vibration. In Mr. Hess' opinion, the cantilever comes closest to the ideal in this respect.

H. R. McMahon, Standard Steel Spring Co., took exception to one statement in the paper to the effect that the reaction is

determined by the load placed upon the spring. He thinks that reaction is determined by the deflection and not by the load. The reason advanced for the less throw of the load with a cantilever spring is that the deflection under static load is usually 100 to 150 per cent greater than with other types.

The thought was also conveyed by Henry Souther that the practice is all too prevalent of designing a car without consideration of the springs; laying out the car and then putting the springs wherever and however the space will permit. They should be as carefully planned for as any other part.

Spiral-Bevel Gears

"In speaking of the advantage of spiral type bevel gears," says A. L. Stewart, Gleason Works, we immediately think of quietness, and this is the point which has led to their great popularity among automobile and axle designers." He says they are more efficient than worm drive and just as quiet. It is easy to make them quiet in manufacture and to maintain them so in use.

Another marked advantage of the spiral type bevels is the range of endwise adjustment of the pinion that is possible without reducing materially the amount of bearing, or introducing noise.

The possibility of using higher ratios in spiral type bevel gears is an advantage which has been quickly recognized. In straight-tooth gears ratios of $4\frac{1}{2}$ to 1 have been about at the dividing line between quiet and noisy gears in automobile drives, and for the high ratios there has been little chance of using a bevel gear drive. We have heard of occasional instances of straight-tooth gears being used for higher reductions, but usually in such cases considerable difficulty has been encountered. We know at present of several 5 and 6 to 1 ratios of spiral type bevel gears giving satisfactory service.

To sum up the case briefly for spiral type bevel gears, I find that they have the advantages of extreme quietness, large range of adjustment, accommodation to distortion of the housings, adaptability to high ratios, high efficiency and good wearing qualities. The only serious disadvantage is the thrust. We believe, however, that spiral type bevels have come to stay, and that designers will quickly learn to make any necessary changes in mounting in order to avail themselves of the many benefits which this type of drive affords.

Regarding the question of tooth face wear, if a pair of straight tooth bevels are taken and examined after use, a distinct line can be seen marking the pitch contact of tooth on tooth. With the spiral gear the surface is polished evenly all over and there is no line to be found, said H. W. Alden, Timken company.

OVERLAND'S 1916 SHIPMENTS 12,000

Toledo, O., June 19—Up to June 12 the Willys-Overland Co. had shipped 12,000 of the new 1916 cars, and the company is now over 21,000 immediate shipping orders behind. The present shipping schedule calls for the shipment of about 380 cars a day. May was the largest month in the history of the company, and sales were 54 per cent ahead of those for the same month last year.

CHAMPION IGNITION EXPANDS

Flint, Mich., June 21—The Champion Ignition Co. will have a capacity for 50,000 spark plugs a day when the new factory addition which is now in course of construction is completed. This new build-

ing will be two stories high, 146 by 60. The porcelain, tool and engineering departments will be housed there while the present factory buildings will be used for the finished product.

There are from 175 to 200 men employed at the plant now, but this number will be increased to at least 250. At the present time the daily output averages from 15,000 to 17,000 cars and although day and night shifts are working, the officials say that they are unable to keep up with the demand.

WAYNE TANK GETS TIME EXTENSION

Chicago, June 19—The Wayne Oil Tank and Pump Co., of Fort Wayne, Ind., defendant in a suit brought against it in the United States district court of the northern district of Illinois, eastern division, by S. F. Bowser & Co., of Fort Wayne, charging three infringements of patents now held by the latter concern relating to improvement in filling and vent-filling devices used in gasoline storage and dispensing systems, has been granted a further extension of 30 days for filing answer to the complaint. This is a second extension, the first being by stipulation April 27, last, when the Wayne company was given 45 days extension beyond the time fixed by the rules of the court.

SUIT CHARGES INFRINGEMENT

Chicago, June 21—Alleging infringement of United States letters patent No. 901,616, E. Hobbs & Co., Inc., an Illinois corporation, has filed suit in the United States district court of the northern district of Illinois, eastern division, against the Columbia Overgaiter and Legging Co., also of Chicago. The plaintiff alleges infringement of patents it holds pertaining to radiator covers. Suit was filed June 10 by plaintiff's attorneys.

CUSTODIAN FOR BRIGGS-DETROITER

Detroit, Mich., June 22—The Detroit Trust Co. was appointed custodian of the Briggs-Detroit Co. by Judge Tuttle, of the United States district court, Wednesday, June 16.

According to a written report made by Vice-president Joseph A. Bower of the Detroit Trust Co., to the court, June 18, there are outstanding drafts to the amount of about \$130,000 and it will be necessary to demonstrate some of the new models produced by the Briggs-Detroit Co., in order to have the dealers honor the drafts.

Three creditors applied to the court to have the company declared bankrupt: the Steel Products Co., which claims that \$4,038.56 is due it; the Michigan Electrical Welding Co., which claims \$3,628.40 and Gregory, Mayer & Thom, who claim \$29. Among the other creditors mentioned are the Kelsey Wheel Co.; the Massnick-Phipps Mfg. Co.; the U. S. Tire Co. The first creditors' meeting since the appointment of a custodian will be held June 25.

Activity in Manufacturing Circles

Knox and S. G. V. Re-enter Field—New Cars Announced by Makers

SPRINGFIELD, Mass., June 19—The Knox motors Association was formed here yesterday to handle the products of the Knox Motors Co. The association is a trust corporation which is to have charge of all the sales and advertising of the motors company, and will act as the distributor of the product. Harry G. Fisk is president; E. O. Sutton, treasurer and general manager, and C. H. Beckwith, secretary. All three men have been identified with the Knox company for several years, and were instrumental in keeping the company alive after the death of Mr. Mayo, who had advanced the company large sums of money. The Knox Motors Co. is now devoting all its energies to a four-wheel tractor designed for all kinds of heavy hauling of materials, such as steel, coal, ore, contractors' supplies, etc.

TO BUILD S. G. V. CARS

New York, June 19—The manufacture of the S. G. V. car will be continued. R. J. Metzler, who bought the Reading plant at the receiver's sale May 27, has bought outright the name, good will, patterns, drawings, jigs, dies and the right to continue the business.

Mr. Metzler now is perfecting a new organization to go into active manufacturing of the car and expects to start work in about a month with a production of about 400 cars a year. At present the New Jersey Machinery Exchange, 23 Mechanic street, Newark, N. J., of which Mr. Metzler is a member, is giving S. G. V. service.

The plant has not been decided on, but Mr. Metzler states that it will either be in Newark or Long Island City. The thirty-two complete chassis offered for sale at the auction June 9 were bought by Mr. Metzler.

DE KALB CAR ON STREET

St. Louis, Mo., June 17—The De Kalb Motor Car Co. has one of its first De Kalb delivery cars on the street. It is a 45-horsepower, six-cylinder car, selling for \$2,250, with choice of body at option of the purchaser. The same chassis will also be used for touring car bodies. The new car's motor is a Beaver and carries the Apple starting and lighting system, Stromberg carburetor and Remy magneto. The rear axle is floating Timken; semi-elliptic springs are used. The wheelbase is 130 inches.

BELL STARTS PRODUCTION

York, Pa., June 19—Operations at the plant of the Bell Motor Car Co. were started this week. The company expects to build a number of cars this month and material for their manufacture is arriving

daily. The company expects to have its plant in full operation by the middle of July. W. F. Grove, for the past several years connected with the sales department of the Pullman Motor Car Co., has become sales manager for the new concern. The Bailey Mfg. Co., engaged in the manufacture of truck bodies, which occupied the plant, has moved to North Wales, near Philadelphia, where a large plant has been erected and the company will engage in the manufacture of bodies for Vim cars.

POPE PLANT ORDERED SOLD

Boston, Mass., June 19—Judge Aldrich of the United States district court gave a hearing yesterday to counsel interested in the Pope Mfg. Co.'s affairs after a report had been filed relative to the sale of the Westfield, Mass., property. George Pope, Charles A. Morss and Charles A. Persons, receivers for the company, in their report stated that H. Preston Cousens, of New York had offered to bid not less than \$725,000 for the property if a sale was arranged not later than July 20.

After listening to the attorneys Judge Aldrich issued a decree ordering the property to be sold on July 20. The receivers will immediately make plans to carry out the decree and the sale will be held at Westfield. This sale relates solely to the Westfield plant and does not affect the property at Hartford, Conn.

THREE NEW REGALS FOR 1916

Detroit, June 22—The Regal Motor Car Co. will have for 1916 a small four selling at \$650, a large four at \$985 and an eight at \$1,200. The latter has a Port Huron motor which is neat in appearance, provides good valve accessibility and fits the same chassis as the big four. The cheapest car has a 3½ by 3¼ motor, the big four 3¼ by 5 and the eight 3 by 4½. As to the chassis, the two larger are very much like last year's model Regal with rear axle transmission and drive through radius rods, while the small car has a unit power plant and a full floating axle.

Special attention has been given to the bodies, which have a family likeness and give a low appearance to the cars. The cheap car has plenty of room for four passengers and the large four and eight, accommodation for five. Electrical equipment on all models consists of the Dyneto single-unit machine with an adjustable chain drive, the chain being enclosed with the front end gearing. Cantilever rear springs are used for the little car and long, underslung three-quarter springs for the other two while the underslung front spring while castor axle continues to be a Regal feature.



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King Speed and John Barleycorn

GASOLINE and booze, like water and oil, will not mix. Cognizant of such an axiom, the management of the Chicago speedway, which will be dedicated with a 500-mile race Saturday, wisely has decreed that liquor shall not be sold on the grounds. Whether the promoters of the Chicago race are disciples of Billy Sunday or not, we do not know, but that they have acted with good judgment is certain. They wish to open the new track under the most favorable auspices, and for that reason have refused John Barleycorn admission to their race and the preliminary practice.

THE Chicago speedway was not put in the prohibition zone until the middle of last week. Previous to that time, liquor was sold within the inclosure to the workmen laboring on the track and grandstands and to the spectators who turned out for preliminary practice and the elimination trials, the authorities of Maywood, within the corporate limits of which the board oval is located, issuing a license to a catering company to supply the spectators with liquid refreshment.

THE practice of Sunday, June 13, which attracted about 9,000 seekers after premature thrills to the new track, was marked by drinking and the careless throwing of empty beer bottles. The crowd was orderly, but there were some bon vivants in the throng

that courted voluntary liquidation and staggered slightly and talked loudly because they were unable to slake their thirst. Carpenters, working under the stands, dodged bottles and several "dead soldiers" were sent to their last rest on the track itself. This careless throwing of bottles might have resulted in the injury of workmen and drivers. Fortunately, it did not, but the management of the speedway has decided to take no chances on such an untoward occurrence on race day, and has figuratively hung white ribbons on the fence and gates of the colossal inclosure at Maywood. The ban on liquor caused a clash between the militia and workmen but in the face of a strike, the speedway refused to countermand its edict.

HAD alcohol not been barred from the Chicago speedway, it is very probable that the great majority of the 100,000 spectators who will witness the race would have acted with the utmost decorum and would have averaged less than one bottle of beer apiece during the thrill-glutted day. There would have been several hundred in attendance, however, who would have made of the occasion a Roman holiday and bacchanal, and to hold the minority in restraint, the prohibition order was issued. Beer and baseball are not allowed to mix, and the combination of gin and gasoline is just as harmful. There is enough genuine excitement at a motor race without calling upon John Barleycorn to furnish incidental and spurious thrills.

Roads and Motor Cars

IT was not so long ago that the passage of a motor car over a county's prize country road was the cause of fervent cursing on the part of the inhabitants of the district. With every car they saw the dollars they expended in road improvement blown over their fields in clouds of dust or pushed into the roadside ditches in avalanches of gravel. Their gravel or thin macadam roads were good enough for the transportation means of the people and they represented a considerable outlay in taxes. The seemingly wanton destruction of the highway by the motor vehicles of the rich men from the city quite often was as much a reason for the speed traps as any innate desire to enforce the law or increase the county treasury by the fines collected.

TEN years ago, or even 3 years ago, it was possible to argue that the roads were good enough for the people, even if they were not adapted to the motor car. But that argument cannot apply now, for the reason that the motor car has become the people's means of transportation and roads are their necessity. The country people need motor roads as much as do their city cousins.

THAT this state of affairs is recognized is brought out forcibly by an editorial in a California newspaper, the Sacramento Union, which cites a strip of highway 6 miles in length

half way between San Francisco and San Jose. This stretch was an ideal road before the coming of the motor car and for that reason has been retained while other sections of the highway more in need of improvement have been reconstructed under the permanent highway system which the golden state has developed. Consequently, this strip of highway, instead of being the best now is one of the poorest in that section.

DURING a recent Sunday a count was made of the cars traversing that strip in a day. There were 12,331 motor cars traveled that section of the road that June day. An examination of the road later showed that gravel which cost the county of San Mateo \$500 was thrown out of the road and into the ditch. Before the coming of the motor car that road was the model of the state. It was built and maintained in as nearly perfect a condition as the macadam road builders of that day could keep it.

UNDER the strain of the motor vehicle traffic the road failed. The editorial points to this as proof that "we must change our road methods to meet the necessities of the motor car * * * we must adapt ourselves to change and changing conditions." This sentiment is becoming general, not only in the West, but in other sections of the country as well.

Race Drivers Arrange for Mutual Accident Insurance

A. D. P. A. at First Meeting Sets Aside Fund to Pay Hospital Bills for Members Injured in Contests

CHICAGO, June 15—Drivers and mechanics, who are injured in races, and their dependents, should the accidents prove fatal, no longer will be the objects of charity, as often has been the case in the past when subscriptions have been taken up to pay the hospital bills or burial expenses of contestants hurt or killed in speed meets.

The Automobile Drivers' Protective Association, organized at Indianapolis at the time of the 1915 Hoosier classic, has established an insurance fund and hereafter will look after its members who sustain injuries or suffer fatalities in the pursuit of their hazardous vocation.

Twenty-five per cent of all revenue paid into the treasury of the protective association will be set aside as an insurance fund and held in trust. A nucleus for this fund was created by the management of the Chicago speedway, which is sharing the receipts from practice with the drivers. The local promoters already have turned over \$1,800, which is 40 per cent of the money taken in at the gate Sunday, to the drivers' association, and \$450 has been deducted from this sum for risk benefits. The remaining \$1,350 will be divided among the teams who warmed up their mounts in order to thrill the Sabbath throng.

Profits for Insurance

In addition to money received for participating in practice, 25 per cent of the initiation fees and annual dues will be put into the insurance fund of the drivers' association.

The drivers held their first meeting since they organized at Indianapolis here today and adopted a constitution and by-laws. The association promises to be a factor for good in the racing game and is not antagonistic to the promoters, as many have been led to believe. The fifteen charter members of the organization are representative drivers and the board of directors is composed of such stars as Ralph de Palma, Harry Grant, Barney Oldfield, Earl Cooper and Bob Burman. Fifty applications for membership have been received.

The officers of the association all are sportsmen prominently identified with the racing game and although they have never sought fame on road or track, have the best interests of the drivers at heart. The following men have been chosen to guide the destinies of the organization during its first year:

President, L. C. Erbes, of St. Paul; first vice-president, E. J. Schroeder, of Jersey City, N. J.; second vice-president, Charles Erbstein, of Chicago, and secretary-treasurer, E. C. Patterson, of Chicago.

The drivers' association is heartily in sympathy with the American Automobile Association in its efforts to put racing on a high plane in this country and the by-laws stipulate that no driver or mechanic can become a member of the organization unless he is in good standing with the A. A. A. and willing to live up to the rules of the contest board. In addition, each member must post a bond of \$1,000 to abide by the A. A. A. rules.

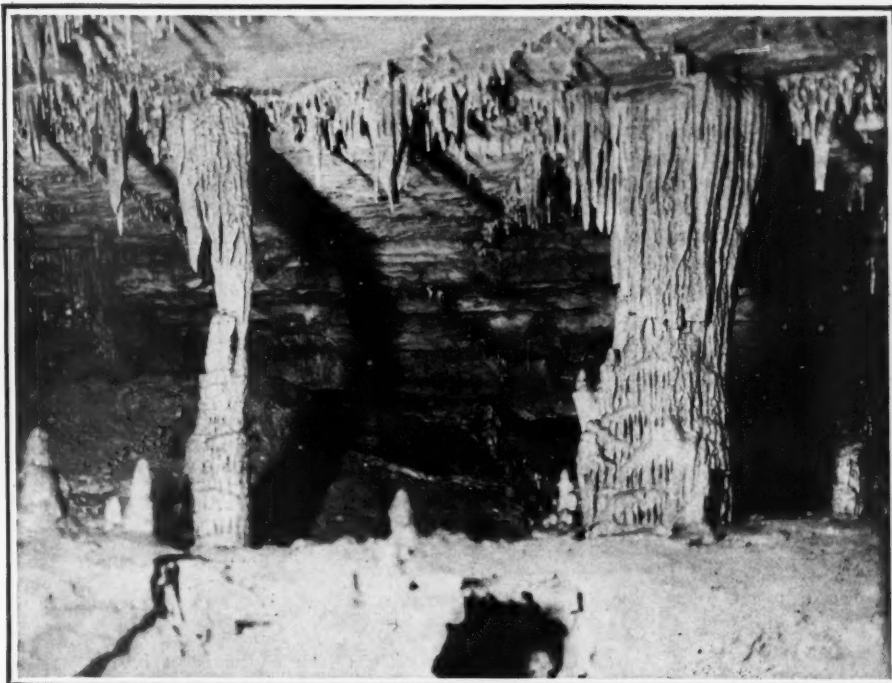
According to President L. C. Erbes, one of the paramount objects of the association is to remedy a condition that threatens to injure the sport.

"There is a dearth of racing cars in this country," he said. "Very few makers

are backing the game and at least 50 per cent of the entries come from individuals. What we need is more cars, and with the manufacturers apathetic, the only way we can get more cars is for the drivers to buy them.

"That race drivers are wealthy is a myth. There are only two or three who could afford to buy a car at the present time. Our association hopes to increase the driver's earning capacity so that he can put aside some money and purchase a machine of his own. If the other promoters will follow the precedent established at Chicago and share the practice receipts with the drivers, the pilots soon will have enough money to buy cars."

See America First — • • • See America Now



EDITOR'S NOTE—This is the thirty-second of a series of illustrations and thumb-nail sketches of historic wonders of America to be published in Motor Age for the purpose of calling the attention of motorists to the picturesque points of interest in their own country.

NO. 32.—STALAGMITES AND STALACTITES IN THE WYANDOTTE CAVE AT MARENGO, IND., DISCOVERED BY A CHILD IN 1883

Within the corporate limits of Marengo, Ind., 37 miles west of Louisville, Ky., Wyandotte cave with its massive halls, crystal domes, grotesque ceilings, giant, glittering stalagmites and icy stalactites, lay for many years hidden in the bosom of Mother Earth until discovered in 1883 by a child who had seen a rabbit disappear beneath the surface of the ground. Curiosity led the child to explore the opening and his were the first human eyes to see this specimen of Nature's handiwork. On entering the cool, spacious, underground rooms one becomes accustomed to the almost impenetrable darkness and is able to catch a glimpse of the frescoed walls and grottoed ceilings. Visitors are at once filled with awe and admiration of this scenic wonder. One room, the crystal palace, 200 by 75 feet and 40 feet high, is the supreme beauty spot of the cave. Words are inadequate properly to describe this work of Nature. Many motorists visit the cave every year.

Twenty-three Cars Qualify for Chicago Speedway Race

Resta's Peugeot and Team Entries of Stutz and Maxwell Make Fastest Laps in Elimination Trials for Saturday's Contest



BURMAN AND COOPER IN SENSATIONAL BRUSH ON CHICAGO SPEEDWAY

CHICAGO, June 22—The stage is set for Chicago's first speed spectacle and 4 days hence an epoch-making race of 500 miles will be run on the new board track 10½ miles east of the commercial zone of the western metropolis.

Twenty-three cars will accept the issue in the international feud of Saturday. This was determined this afternoon when the final elimination trials were held and four additional entries joined the exclusive ranks of the twenty space-destroyers that qualified in the laps against time run on Tuesday and Wednesday of last week.

The cars will be sent away by Starter Fred J. Wagner in the following rows of four each:

First row—Resta's Peugeot, Wilcox's Stutz, Anderson's Stutz and Cooper's Stutz.

Second row—Carlson's Maxwell, Rickenbacher's Maxwell, Burman's Peugeot and Von Raalte's Sunbeam.

Third row—Porporato's Sunbeam, Chevrolet's Delage, Keene's F. R. P. and O'Donnell's Duesenberg.

Fourth row—Grant's Sunbeam, Alley's Duesenberg, Henning's Mercer Special and Haupt's Duesenberg.

Fifth row—Babcock's Peugeot, Joe Cooper's Sebring, Rawling's Ogren and Hughes' Porter-Knight.

Sixth row—Orr's Maxwell, Devore's F. R. P. and Mulford's Mulford Special.

The order of start was determined by the time made in the elimination trials, the four fastest cars starting in the first row, the second speediest quartet in the second tier, etc.

The four cars that qualified today were Henning's Mercer Special, Mulford's Mulford Special, Hughes' Porter-Knight and Rawlings' Ogren, a post entry that was accepted only after all the drivers consented to the eleventh-hour nomination.

Limberg's Sunbeam, which qualified at a speed of 90.8 miles an hour last week, will not be allowed to start. There are three other Sunbeams in the race, all of which made faster time in the eliminations, and consequently Limberg's mount is

Cars That Qualified for the Chicago Race and Their Times Made in the Elimination Trials

Car and Driver	Time	M. P. H.	Best Lap at Indianapolis
Peugeot, Dario Resta.....	1:05.4	110.1	98.5
Stutz, Wilcox.....	1:08.7	104.75	98.9
Stutz, Earl Cooper.....	1:08.8	104.6	96.75
Stutz, Anderson.....	1:08.8	104.6	96.4
Maxwell, Carlson.....	1:09.78	103.2	84.10
Maxwell, Rickenbacher.....	1:09.9	103.00	82.0
Peugeot, Burman.....	1:11.3	101.0	92.4
Sunbeam, Von Raalte.....	1:11.45	100.8	93.75
Sunbeam, Porporato.....	1:12.96	98.65	95.10
Delage, Chevrolet.....	1:14.3	96.9	87.2
F. R. P., Keene.....	1:14.3	96.9	....
Duesenberg, O'Donnell.....	1:14.7	96.4	89.0
Sunbeam, Grant.....	1:14.8	96.30	89.30
Duesenberg, Alley.....	1:15.9	95.0	90.0
Mercer, Henning.....	1:16.0	94.80	....
Duesenberg, Haupt.....	1:16.71	93.90	82.7
Peugeot, Babcock.....	1:17.0	93.5	89.9
Sebring, Joe Cooper.....	1:18.0	92.30	85.5
Ogren, Rawlings.....	1:18.30	92.0	....
Porter-Knight, Hughes.....	1:18.98	91.15	....
Maxwell, Orr.....	1:20.5	89.6	83.5
F. R. P., Devore.....	1:21.3	89.55	....
Mulford Special, Mulford.....	1:23.75	86.05	....

automatically barred by the three-car rule of the American Automobile Association.

In addition to Limberg's Sunbeam, the following original entries will not start: Ralph de Palma's Mercedes, Barney Oldfield's Bugatti, Brown's DuChesneau, Vail's Mulford Special, Zucher's Berwyn Baby and Mais' Mais Special. The Mercedes and Bugatti were scratched last week because of mechanical trouble, the DuChesneau and the Mulford Special failed to make their appearance, the Berwyn

Baby was hopelessly slow and the Mais Special is suffering from incurable lubrication ailments.

In an effort to better their starting positions, several of the drivers qualified their cars for a second and third time today and eight succeeded in making faster laps than they did in their first eliminations. The surprise of the day was the showing of the two Maxwells, tooled by Rickenbacher and Carlson. Neither appeared exceptionally speedy when they

qualified last week, but this afternoon they averaged 103 miles an hour or better and earned a place in the second row of starters.

The two English Sunbeams, entered by the British maker, also had greater speed today than they showed last week, Von Raalte increasing his average speed from 93 to 100.8 miles per hour and Porporato hitting 98.65 miles per hour in his third trial. Harry Grant drove some of the bugs out of his six-cylinder motor since last week, when his best time was 91 miles per hour, and covered a lap at a 96-mile-an-hour clip this afternoon. Haupt's Duesenberg has more speed than it did last week and Joe Cooper's Sebring raised its average from 89 to 92.3 miles an hour.

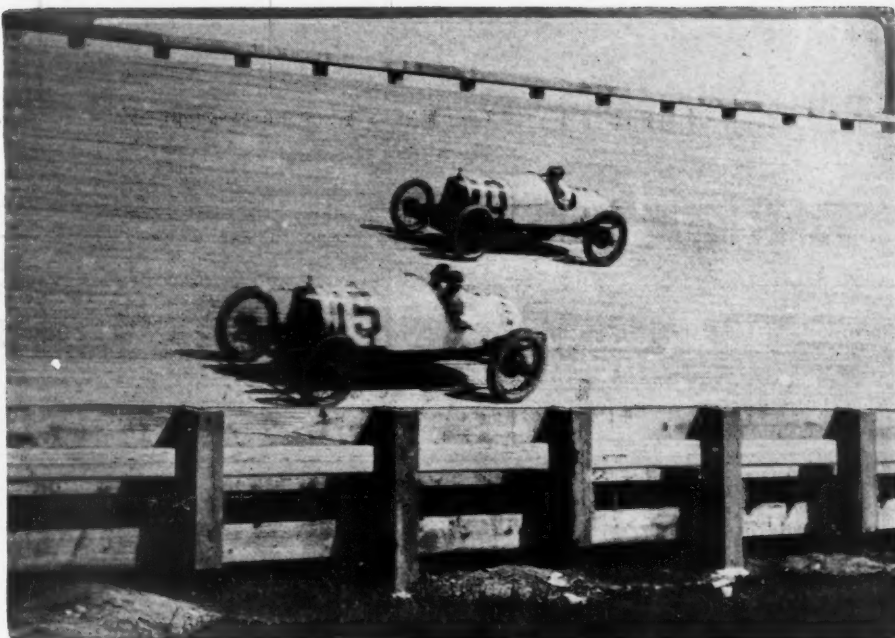
The drivers will have 2 more days of practice before the race, as the track will be closed on Friday in order to prepare it for the inaugural contest.

Stutz Favorite Team Entry

As at Indianapolis 4 weeks ago, the three Stutz cars are the favorite team entry with the railbirds who figure that the Hoosier-made space-destroyers have an even better chance of taking first honors Saturday than they did on the brick oval May 31.

Although Resta's Peugeot made faster time in the elimination trials than did the white mounts of Gil Anderson, Earl Cooper and Howdy Wilcox, the difference in the average speed was not great enough to give the French car a decided advantage. The three Stutz entries qualified at a speed a fraction better than 104 miles an hour and in this respect showed a consistency that is truly remarkable.

When the starting bomb explodes 4 days hence, Stutz will adopt the same tactics that he did at Indianapolis when he ordered Anderson and Wilcox to beat it in an effort to tempt de Palma and Resta to run the wheels off the Mercedes and Peugeot. This strategy failed on the



O'DONNELL AND ALLEY WARMING UP DUESENBERGS ON CHICAGO SPEEDWAY

Hoosier oval, as de Palma and Resta were too busy watching one another to pay much attention to the early pacemakers.

In the Chicago race, Resta will have to meet the Stutz drivers single-handed. De Palma, his partner in the successful defensive alliance at Indianapolis, will not start and the speed fans figure that the Vanderbilt cup and grand prize winner will have to use all his skill and cunning if he hopes to escape the trap which Stutz has laid for him. Resta is a resourceful pilot and may be able to brake his natural impetuosity and refuse to endanger his car by accepting the sure-death challenge.

The Stutz backers also claim that their favorites are in much better condition to withstand the high-speed test than is the Peugeot. The three Stutz cars have been completely overhauled since the Indian-

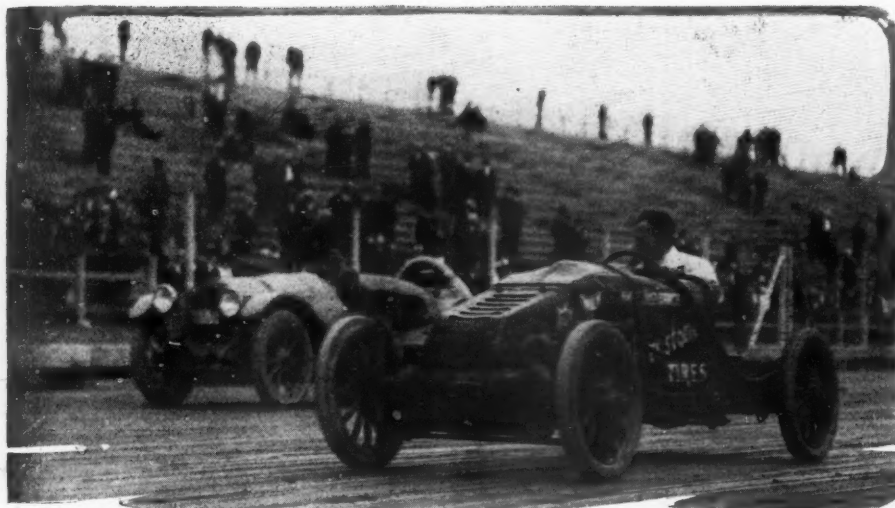
apolis race. The French space-eater also has been worked upon, but in the preparation, Stutz has had the advantage of a factory organization, while the Peugeot has been put in racing trim by Resta and the small corps of mechanics in his retinue.

Porporato Looks Dangerous

The opinion is common that Porporato and the English Sunbeam will be a factor in the race and much more dangerous than at Indianapolis when the British entry was eliminated near the close of the classic with a faulty carbureter when running well inside the money. The Sunbeam is built for a banked track, such as is the course for Saturday's gasoline derby, and both Porporato's mount and that of Von Raalte have been fitted with the same gears as were used at Brooklands for successful time trials. Porporato is a master-



VIEW OF THE HOME STRETCH OF THE NEW CHICAGO BOARD TRACK, SHOWING COLOSSAL GRAND STAND AND TOWERING PAGODA FOR OFFICIALS AND PRESS MEN



BARNEY OLDFIELD IN CHRISTIE AT START OF RECORD LAP OF 111.5 MILES AN HOUR MADE ON CHICAGO TRACK LAST SUNDAY

ful driver and absolutely fearless. Like the majority of foreigners, he shows his car no mercy and if the Sunbeam stands up under him, he should be a serious contender all the way.

The Stutz and Maxwell look to be the class of the American team entries. The Duesenbergs have not shown the speed in practice or the eliminations that the Indianapolis and Detroit creations have displayed and the Porter-Knights have not passed the experimental stage in their development as yet. By the day of the race, the drivers of the sleeve-valved cars may have worked the bugs out of the new motors and the mechanical debutantes may spring a surprise.

There has been plenty of excitement at the Chicago speedway since the day of the postponement to keep the appetite of the fans whetted. The first episode of note in the rain-bound hiatus was a strike of the carpenters Thursday when 500 workmen laid down their saws and hammers and refused to finish the grandstands until the five companies of national guardsmen, who are patrolling the track, were ordered from the grounds.

The trouble arose at the noon hour, when a soldier grabbed a bottle of beer from one of the workmen. The day previous, the speedway management issued an edict that no liquor was to be sold at the track and the guardsman believed he was acting under orders in his attempt to convert the carpenter by means of strong-arm methods far more strenuous than those used by Billy Sunday. After the strike, practice was halted, as the workmen refused to remove the lumber from the course. Thursday night, the union officials and the management of the speedway held a meeting and a compromise was effected, the carpenters going back to work Friday morning.

Sunday was another red letter day, for in the presence of more than 40,000 spectators who turned out to witness practice, Barney Oldfield established a new lap rec-

ord for the wooden bowl. At the wheel of his Christie, the veteran covered the 2 miles in 1 minute 4½ seconds. This average, 111.5 miles an hour, betters the elimination lap of Resta's Peugeot, which made a circuit of the track at a speed of 110.1 miles an hour.

SEVENTEEN CARS FOR TACOMA

Tacoma, Wash., June 19—Seventeen entries have been received to date for the three races to be held on the new Tacoma board speedway July 4 and 5 and one or two more nominations are looked for before the lists close next week.

Barney Oldfield is now en route from Chicago. He has closed a contract for the Peugeot that Dario Resta drove to victory in the 1915 grand prize and Vanderbilt cup events and will pilot it here.

The cars and drivers that are sure to start are as follows:

Peugeot, Oldfield; Mercer, Ruckstell; Marmon, Reynolds; Mercer, Pullen; Gordon Special, Elliott; Peugeot, Burman; Stutz, Cooper; Stutz, Lewis; Stutz, Hill; Parsons Special, Parsons; Schneider Special, Schneider; Stutz Special, Hendricks;

Maxwell, Carlson; Mercer, Thomas; Mercer, Stratton; Romano Special, Lentz; and Velie, Barsby.

RACE MEET AT BOSTON JULY 5

Boston, Mass., June 19—Charles B. Johnston, who has leased the Readville track for this year, has applied for a sanction for a card of motor races there July 5. He is a member of the Bay State A. A. and that organization having decided not to enter the racing game, has waived objections to any sanction and the members plan to aid Johnston in making the meet successful. He will go to New York next week to secure entries and some of the drivers who have competed at Brighton Beach under the management of Matty Matthews will be invited to compete. Races for local men also will be staged. It will be the first race meet in Boston for several years.

3000 WORK ON GOTHAM TRACK

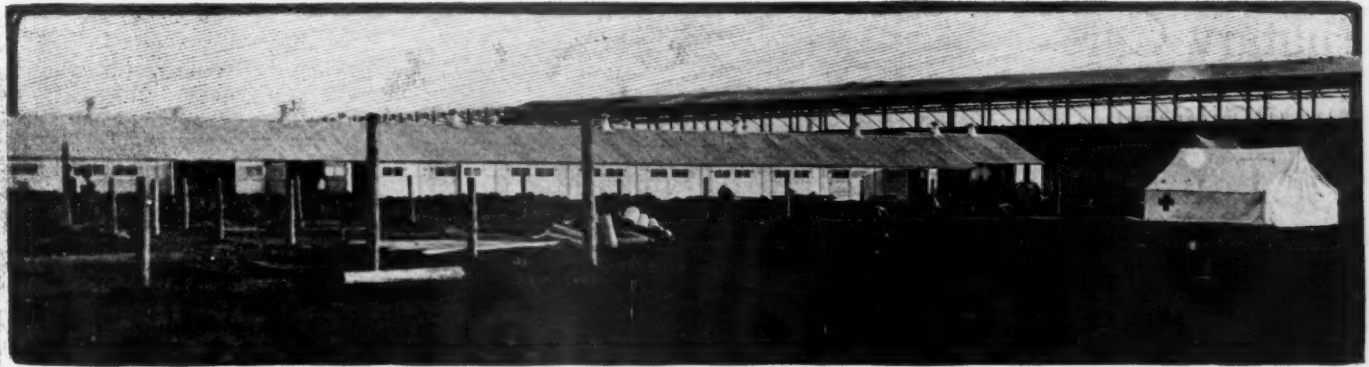
New York, June 18—Before the end of the present week, nearly 3,000 men will be at work on the construction of the 2-mile Sheepshead Bay motor speedway, which is being built in this city and on which a 350-mile race is scheduled for October 2.

Up to date, the steel frame work being used for the track on the curves at each end is up for one end, and the laying of the two by four timbers for the track proper was begun the middle of the week. On the straightaways the board surface is being laid on cement cross girders, and all of these are in place on one straightaway and will soon be completed for the other. The laying of the track surface on the back stretch is at present under way. Not so good progress is being made on the steel frame work at the other end of the track, the work on which has not yet started, due to a heavy fill having to be completed. The cement piers for the grandstand and bleachers are being poured and the steel work for the grandstand is on the ground.

The banking on the curves is most impressive, the steel girders being hollowed

Brief Specifications and Probable Equipment of Cars

Car	Driver	No. Cyls.	Bore and Stroke	Piston Dis- p't	Cast	No. Valves	Valve Arrangement	Magneto	Carburetor
Stutz	Anderson	4	3.812x6.5	296.8	Block	16	Overhead camshaft	Bosch	Stromberg
Stutz	Cooper	4	3.812x6.5	296.8	Block	16	Overhead camshaft	Bosch	Stromberg
Stutz	Wilcox	4	3.812x6.5	296.8	Block	16	Overhead camshaft	Bosch	Stromberg
Sunbeam	Van Raalte	4	3.700x6.3	274.0	Block	16	2 overhead camshafts	Bosch	Zenith
Sunbeam	Porporato	4	3.700x6.3	274.0	Block	16	2 overhead camshafts	Bosch	Zenith
Sunbeam	Grant	6	3.260x5.89	274.9	Threes	12	Left head	Bosch	2-Master
Sunbeam	Limberg	6	3.260x5.89	274.9	Threes	12	Left head	Bosch	Master
Duesenberg	O'Donnell	4	3.980x6.00	299.0	Block	8	Side horizontal	Bosch	Schebler
Duesenberg	Alley	4	3.980x6.00	299.0	Block	8	Side horizontal	Bosch	Master
Duesenberg	Haupt	4	3.980x6.00	299.0	Block	8	Side horizontal	Bosch	Master
Maxwell	Carlson	4	3.750x6.75	298.2	Block	16	2 overhead camshafts	Bosch	Master
Maxwell	Rickenbacher	4	3.750x6.75	298.2	Block	16	2 overhead camshafts	Bosch	Master
Maxwell	Orr	4	3.750x6.75	298.2	Block	16	2 overhead camshafts	Bosch	Master
Delage	Chevrolet	4	3.660x7.09	298.68	Block	16	Side horizontal 2 camshafts	2-Bosch	Claudel
Peugeot	Burman	4	3.650x7.10	296.00	Block	16	2 overhead camshafts	Bosch	Master
Peugeot	Resta	4	3.620x6.67	276.00	Block	16	2 overhead camshafts	Bosch	Zenith
Peugeot	Balcock	4	3.620x6.67	276.00	Block	16	2 overhead camshafts	Bosch	Zenith
Mulford	Mulford	4	3.687x7.00	299.00	Pairs	16	Side horizontal 2 camshafts	2-Bosch	Master
Owren	Rallings	4	3.750x6.75	298.20	Block	8	Left head	Bosch	Rayfield
Mercer	Henning	4	3.750x6.75	298.20	Block	8	Left head	Bosch	Rayfield
Porter-Knight	Hughes	4	3.750x6.12	270.5	Single	.....	Auxiliary exhaust Knight	Bosch	Rayfield
Porter-Knight	Devore	4	3.750x6.12	270.5	Single	.....	Auxiliary exhaust Knight	Bosch	Rayfield
Porter-Knight	Keene	4	3.750x6.12	270.5	Single	.....	Auxiliary exhaust Knight	Bosch	Rayfield
Sebring	J. Cooper	4	3.985x6.00	299.30	Block	8	Side horizontal	Bosch	Master



STEEL GARAGES AND HOSPITAL TENT IN THE INFELD OF THE NEW CHICAGO SPEEDWAY

so that the curve from the inside of the track to the outside is a paraboid rather than a straight line, as in the Chicago track. The width of the track on these curves is 78 feet. Throughout this width it is not supported entirely on steel, approximately the inner third being cement girders, which are continued into the steel girders. The steel construction is particularly rigid, every alternate tier being in the form of a steel tower braced transversely and diagonally.

The track is 70 feet wide on the straight-aways and in addition to this there is on the straightaways and also on the turns, an inside safety apron of solid turf, approximately 30 feet wide. Inside of this comes the cement safety retaining wall, which will prevent a car from reaching the spectators should it cross this safety apron.

The grandstand will be of two-story steel construction, covered, and seating 28,000. On the opposite side of the track are uncovered bleachers for 30,000 persons, which brings the total seating capacity up to 58,000.

According to present estimates, the total cost of the grandstand, track and necessary buildings will approximate \$710,000, divided as follows: Grandstand, \$260,000; track, \$250,000; buildings, fences and other improvements, \$200,000.

A.A.A. Amends Three-Car Race Rule

Five Machines of Same Lineage May Start in Future Contests.

NEW YORK, June 22—Special telegram —At a meeting of the contest board of the American Automobile Association, changes in the contest rules were made which will permit of starting five cars of one make in a contest instead of three as formerly. Where five cars are entered, three may be entered as a factory or team entry and the two additional cars may be entered by individuals having no connection with the factory or team.

A plan has been adopted to register all racing cars so as to avoid certain abuses now existing and each racing car will be designated as a special model.

Alex Sloan and Ernie Moross were disqualified for running outlaw meets, the disqualification being for 3 years from date of last unsanctioned contest.

Drivers connected with them were disqualified for a period of 1 year from date of their last offense. Drivers reinstated by the board included Hughie Hughes, Arthur Chevrolet, Omar Toft, Herb Alderson, Harry N. Agerter, C. O. Nornan and Charles W. Johnson. Further changes in

rules limit the length of a handicap on a 1-mile track to 10 miles.

SUIT ON FORD STARTERS

New York, June 21—The Eisemann Magneto Co. was successful in defending a suit brought against it by the Splitdorf Electrical Co. charging infringement of a patent on a Ford magneto bracket. The Eisemann company claimed the device at issue had been made and sold by other companies than Splitdorf for some time and denied infringement. The bracket is said to be a well-known form of construction for attaching a magneto to a Ford. The patent is No. 1,102,385 and the suit was brought in the United States district court in this city last August.

FORD PRICES TO BE CUT

Detroit, Mich., June 21.—According to an announcement made by Henry Ford today, the Ford motor car, which now sells for \$440 net, will be slightly reduced in price next year.

Asked regarding the rumor that the car would sell for \$350, Mr. Ford said:

"That could not be done at present, but every reduction brings motor cars to a level at which thousands more people can acquire them. We are near the end of the motor car year now and cannot reduce the price to such a figure as \$350, but are planning a slight reduction. That \$350 price is too low at present, but perhaps some time we may be able to reach it."

THOMAS M. CUSTER DIES

Milwaukee, Wis., June 19—Thomas M. Custer, general purchasing agent of the A. O. Smith Co., Milwaukee, frames, parts and trucks, and one of the best known steel experts in the country, died at Milwaukee, June 17, of peritonitis, following an operation for appendicitis May 21.

Mr. Custer was born in South Ronaldshay, Orkney Islands, Scotland, in 1872 and came to America in 1891. He sailed the great lakes for a number of years.

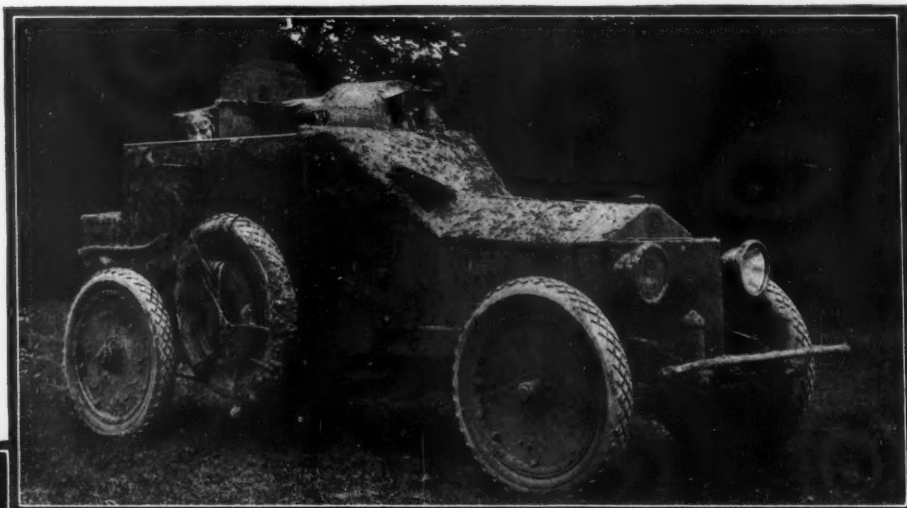
Starting in 500-Mile Race at Chicago, June 26

Wheel base	TIRES		Wheels	Wgt.	Shock Absorbers	Lubricant	Other Equipment	Spark Plugs	Driver	Car
	Size	Make								
104	33x5	Silvertown	Houk	2340	Hartford	Oilsum-Castor	Motometer	Bosch	Anderson.....	Stuts.
104	33x5	Silvertown	Houk	2385	Hartford	Oilsum-Castor	Motometer	Bosch	Cooper.....	Stuts.
102	33x5	Silvertown	Houk	2404	Hartford	Oilsum-Castor	Motometer	Bosch	Wilcox.....	Stuts.
112	35x4	Cord	R.-W.	2244	Hartford	Castrol.....		K.L.G.	Van Ralite.....	Sunbeam.
112			R.-W.	2300	Hartford	Castrol.....		Bosch	Porporato.....	Sunbeam.
110	35x5	Silvertown	R.-W.	2480	Hartford	Oilsum-Castor.		K.L.G.	Grant.....	Sunbeam.
116			R.-W.*		Hartford	Oilsum-Castor.		K.L.G.	Limberg.....	Sunbeam.
106	33x5	Silvertown	R.-W.	2170	Hartford	Oilsum-Graphite*	Motometer	Bosch	O'Donnell.....	Duesenberg.
106	33x4 1/2	Silvertown	R.-W.	2120	Hartford	Oilsum-Graphite*	Motometer	Bosch	Alley.....	Duesenberg.
106	33x4 1/2	Silvertown	R.-W.		Hartford	Oilsum-Graphite*	Motometer	Bosch	Haupt.....	Duesenberg.
105	35x5	Silvertown	Houk	2202	Hartford	Oilsum.....	Motometer	Bosch	Carlson.....	Maxwell.
105	35x5	Silvertown	Houk	2267	Hartford	Oilsum.....	Motometer	Bosch	Rickenbacher.....	Maxwell.
										Maxwell.
110	33x4 1/2	Silvertown	R.-W.	2350	Hartford	Oilsum-Castor.	Motometer	Bosch	Orr.....	Delage.
105	34x4 1/2		R.-W.	2350		Oilsum-Castor.	Motometer	Bosch	Burman.....	Peugeot.
109	35x5	Silvertown	R.-W.	2400	Hartford	Oilsum-Castor.	Motometer	Oleo	Resta.....	Peugeot.
104	34x4 1/2	Silvertown	R.-W.	2100	Hartford	Oilsum-Castor.	Motometer	K.L.G.	Babeock.....	Peugeot.
	33x4 1/2	Silvertown	R.-W.		Hartford	Oilsum.....	Motometer	Rajah	Mulford.....	Mulford.
									Ralings.....	Ogren.
110		Silvertown	R.-W.			Oilsum.....	Motometer	Bosch	Henning.....	Mercer.
109	33x4 1/2	Silvertown	R.-W.		Hartford	Oilsum-Graphite*	Motometer	Bosch	Hughes.....	Porter-Knight.
109	33x4 1/2	Silvertown	R.-W.		Hartford	Oilsum-Graphite*		Bosch	Devore.....	Porter-Knight.
109	33x4 1/2	Silvertown	R.-W.		Hartford	Oilsum-Graphite*		Bosch	Keene.....	Porter-Knight.
102	33x5	Silvertown	R.-W.	2490	Hartford	Oilsum-Graphite*		Rajah	J. Cooper.....	Sebring.

*Dixon's.

Military Cars Conquer Mud in Tour to Coast

Motor Convoy of Cadets Drive
in Drenching Rain First
Week of Run



UPPER ILLUSTRATION—ARMORED CAR IN CONVOY COVERED WITH MUD PICKED UP FROM NEBRASKA ROADS. LOWER ILLUSTRATION—CADETS ON TRANSCONTINENTAL RUN ENCAMPED FOR NIGHT AT MOLINE, ILL.

KEARNEY, Neb., June 18—Exposed to slush and mud instead of 42-centimeter shells and dum-dum bullets, the nine military motor cars in the transcontinental convoy of the Northwestern Military and Naval Academy of Highland Park, Ill., arrived here today after a continual battle with drenching rain and soft roads encountered in the tour from Chicago.

The thirty cadets who compose the motor corps have been on the road 9 days to date and are convinced that Sherman's oft-quoted definition of war also applies to touring, for the nimbus clouds have followed them thus far and they have pitched camp nightly in the rain.

The cars were covered with mud when they entered the city this evening. They had ploughed through the gumbo roads of Nebraska since daybreak and bore the stains of travel under inclement weather conditions. While pitching their tents on a high hill, the soldiers in the making were christened by a hail storm.

Lieutenant G. E. Arnemann, of the Twenty-eighth Infantry, United States army, who is accompanying the convoy for the purpose of making personal observations, states that the tour thus far has been as arduous as any in which Uncle Sam's regulars have participated.

The convoy left Chicago late on the af-

ternoon of June 10 and made the 40-mile run to Aurora before sundown. After camping for the night, the cars were driven west through Ottawa, LaSalle, Princeton and Moline to Davenport, where the government arsenal was visited. In the trip across Iowa, Des Moines was reached at 2 o'clock Sunday afternoon and Omaha was the terminus of Wednesday's run. Rain was encountered yesterday and the journey to Columbus, the night stop, was a battle with mud and water all the way.

The majority of the cars in the convoy are eight-cylinder Cadillacs. They have stood the exacting test remarkably well. The flexibility of the motor has enabled the drivers to hit speeds ranging from 3 to 50 miles an hour and has simplified the task of pulling through the gumbo and climbing steep hills.

TEXAS-TO-SEA RUN POPULAR

Galveston, Texas, June 19—The plan of Maco Stewart, president of the Texas State Automobile Association, and others who are promoting the Texas-to-the-Sea reliability run that is to end here during the seventh annual cotton carnival and exposition, July 22 to August 1, are exceedingly well pleased with the interest that is being manifested in the proposed

event by motorists all over Texas. R. Kennerdell, chairman of the contest board of the American Automobile Association, has authorized the run, subject to the approval of local rules under grade four for interclub runs. As features of the event there probably will be a contest between the various motor clubs of the state and a contest between individual machines on points of merit. A large number of dealers have made requests for space for exhibits at the exposition hall during carnival week.

ANOTHER NORTH-SOUTH HIGHWAY

Louisville, Ky., June 19—At a meeting of the Lincoln Central Road Association held Thursday at Hodgenville, another movement for a north and south highway, rivaling the Dixie highway, took definite shape when Dr. R. R. Elmore, of Louisville, offered a resolution authorizing commissioners who have been appointed by the association for Kentucky to act with commissioners designated for other states in furthering the plan. The resolution was adopted.

Peter Lee Atherton, Dr. Elmore, Judge Wallace Brown, of Bardstown, and Emory Dent, of Barren county, have been appointed to represent Kentucky, with Mr.

Atherton, who is president of the association, as chairman. Charles Bookwalter, of Indianapolis, and Walter Crimm, of Salem, thus far have been designated to represent Indiana.

The other states interested in the movement are Michigan, Tennessee and Alabama, as it is proposed to route the new highway from Mackinaw by way of South Bend, Logansport, Indianapolis, Louisville, Nashville and Birmingham to Pensacola. The proposed road will be more than 800 miles in length, but will be the shortest and most direct route from the lakes to the gulf, according to the promoters.

SERVICE MANAGERS TO MEET

New York, June 21—Announcements have been sent to its members by the National Automobile Chamber of Commerce calling a meeting of service department managers to be held in the Hotel Statler, Detroit, June 29 and 30. The purpose of the meeting is to consider the handling of repair parts accounts with dealers with a view to formulating a standard repair parts policy and also to discuss various phases of service to owners as given by manufacturers and dealers.

The program, now being arranged, provides for about a dozen papers on these subjects, in which members of the N. A. C. C. are deeply interested.

A call also has been issued for a meeting of the commercial vehicle committee of the N. A. C. C. and the special committee of five representatives of truck manufacturing companies that are not members of the N. A. C. C. which was appointed at the motor truck convention in Detroit last month to draw up a form of service policy for commercial vehicles to be recommended for general adoption as a standard.

This meeting is to be held in Detroit simultaneously with the service managers' convention.

McCALL APPOINTED SECRETARY

Chicago, June 19—F. E. McCall, of the Commonwealth Edison Co., has been appointed secretary of the Associated Garages of America, the national garage association which was formed in this city at the time of the Chicago motor show. The appointment was made by President Robert Bland. Following the retirement from the office some time ago of H. G. Rich, the duties have been temporarily performed by Secretary E. J. McGuirk of the Garage Owners' Association of Illinois and the national body's official organizer.

RIDE FOR ST. LOUIS ORPHANS

St. Louis, Mo., June 16—Eighteen hundred orphans and other juvenile wards of the city were given a motor outing by the Automobile Club of St. Louis today. Two hundred and twenty-five members contributed their machines and chauffeurs to the enterprise and many of the owners personally acted as the children's hosts.

Motor Relay Makes Chicago-Seattle Dash in 97 Hours

Dedication of Yellowstone Trail Results in Record Time to Coast with Mayor's Message

SEATTLE, Wash., June 19—A record of 2,439 miles in the elapsed time of 97 hours and 10 minutes has been established over the Yellowstone trail from Chicago to Seattle, Wash., and Mayor Hiram Gill is in possession of a letter carried by a relay of twenty-one couriers from Mayor William Hale Thompson of Chicago.

Despite heavy rains, collisions, tire troubles, a broken steering gear, and a broken axle, the proposed record of 100 hours was shattered. The message, which left Chicago June 15 at noon, was delivered at 11:09 a. m. today.

The last relay driver, Joseph Steiner, in a Studebaker, crossed the Seattle city limits at 10:52 a. m. and so well was the route policed that he reached the center of the city in 16 minutes and a minute later he handed over the message, which was not due until 2 o'clock.

To prove the suitability of the new trail as a touring route for "Seeing-America-First" parties and to demonstrate that the roads that could be covered in record time might be covered even more satisfactorily in slow time, the 100-hour relay race was conceived by officials of the Yellowstone Trail Association. Every aid was given in the preparation of country roads and further aid is promised.

Great Interest Manifested

As the relay went westward, the excitement over the run increased until in Montana the war talk was shelved. Elimination runs for drivers for the relays were instituted and the residents lined the streets leading through the various cities as the couriers passed through on their race westward.

The first division of the trail, through Wisconsin, was made in 17 hours 50 minutes. This means that the run from Chicago to Minneapolis, 521 miles by road, was negotiated at an average of 29 miles an hour, or considerably over the prescribed rate of 24.39. This division is the latest to be added to the trail, which originally extended no farther east than the twin cities. The arrival at Minneapolis was 2 hours and 20 minutes early. For the first relay, Chicago to Milwaukee, 97 miles, a gain of 1 hour and 5 minutes was made. W. J. Boone was the driver. In his Moline-Knight car were President J. W. Parmley of the trail association and President J. R. Brown of the Chicago Automobile Club. The roads were good and time was made easily.

Except for one bad stretch, the second relay to Oshkosh, 88 miles, was over good roads, well placarded. The time was about

4 hours, 35 minutes being lost through tire trouble. Fred Gettelman was in charge. Fred Redeman, of Oshkosh, covered the run to Stevens Point, 79 miles, in 2 hours and 35 minutes, a gain of 1 minute 5 seconds.

The run from Stevens Point to Chipewewa Falls, 117 miles, was made by G. W. Andree in a Pope-Hartford. He arrived 1 hour and 14 minutes ahead of the tentative schedule of 3 hours and 40 minutes. The fifth relay, to Minneapolis, 96 miles, was covered an hour under running time, notwithstanding the bad roads due to rain. G. S. Murphy drove in a Mitchell six with G. E. Dee as pilot, half way, and E. C. Baldwin at the wheel for the second leg. The car, in traveling 45 miles an hour, jumped a ditch into an oat field. Twenty-five miles was over new road.

Accident Costs 24 Minutes

Arriving at the Minneapolis city hall at 5 a. m., the transfer of the letter was made to Dr. H. F. Marston, one of the trail association directors who boarded a Studebaker car driven by O. H. Gray, for the sixth relay to Olivia, Minn. The arrival there was at 10:21 a. m., June 16, 2 hours and 4 minutes ahead of the schedule for the 104-mile drive.

Bad roads and the first real accident of the tour marked the sixth relay. The accident lost 24 minutes of the 2 hours and 30 minutes gained on the run from Chicago. One mile west of Hector, Minn., the couriers crashed into a skidding car which damaged engines, bent wheels and axles and necessitated telephoning for a substitute machine.

Relay seven, from Olivia to Ortonville, on the state line, is 103 miles. This was covered by Albert Palmlund, driving a Studebaker. He is an expert driver and covered the distance without loss of time. Four hours and 25 minutes was the allowed time on the run. Palmlund did better.

The next relay of the run was 128 miles to Aberdeen, S. D. The message was carried by Emil Ostlind in a Reo. He arrived at Aberdeen 2 hours and 50 minutes ahead of schedule. The time gained would have been 3 hours, except for a gasoline stop 3 miles from the city limits. J. B. Keeny, president of the Aberdeen Automobile Club, pacemaker in a Marmon, discovered that he was not being followed, so turned back and grabbed the message to insure no loss, Ostlind following close behind.

Relay nine, to Moberly, on the Missouri river, was 103 miles, with a schedule of 4 hours 15 minutes. The Ford made its

entry here, driven by S. H. Collins. It picked up 15 minutes to the next station on the railroad, and at Bowdle, S. D., the time saved was advanced to 3 hours and 5 minutes. Between Selby and Mobridge, the roads were so bad that Mobridge was reached only 2 hours 52 minutes ahead of schedule.

Plucky Drive at Night

Another Ford car, driven by J. W. Harris, was message bearer from Mobridge to Lemmon, S. D. Road troubles reduced the gain to 12 minutes. The run was made almost entirely in the dark, which added to the difficulties and constant rains had soaked the trail. This drive is regarded as the pluckiest fight of the race. Harris was due in Lemmon, S. D., at 6:10 a. m., mountain time, and it was 5:58 when he turned the message over to Earl E. Patke in his Dodge car.

The next relay was 112 miles, to Marmarth, N. D., and the distance was made with a gain of 58 minutes. Patke reached his terminus at 9:47 a. m., June 17. The roads improved west from Mobridge, permitting Patke to pick up 46 minutes with comparative ease.

From Marmarth to the next relay stop, Miles City, Mont., is 145 miles. F. A. Bordwell, in an Overland, arrived 40 minutes ahead of time. The arrival was at 3:35 p. m. He covered the first 28 miles in 53 seconds. This lap was one of the worst. Tire troubles and bad roads caused delays and a detour, to go around a fallen bridge, took half an hour.

Miles City to Billings, Mont., is 157 miles, the thirteenth relay. The distance was covered by Jerry Clifford in a Haynes, arriving at 9:57 p. m., which was a gain of 48 minutes on the total time. An accident necessitated use of a relief car a few miles out.

Billings to Livingston, 130 miles, was the

drive for Lee Mains, in an Oldsmobile. With two serious accidents to his disadvantage, Mains is credited with the fastest run in the tour. He spilled once and broke his steering gear, yet arrived on time.

H. G. Blair in a Buick was chosen for the Livingston-Butte section of the tour, the first in the new western division of the trail. The distance is 137 miles. The arrival was at 8:10 a. m., June 18, which was 1 hour and 45 minutes ahead of the schedule. No. 16 relay, Butte to Missoula, was 131 miles. The streets were policed and the entry was made at 60 miles an hour.

The next two relays, from Butte to Missoula and from Missoula to Wallace, Idaho, 265.5 miles, were covered in 9 hours 54 minutes by Matt Barry, of Butte, and Walter Beck, of Missoula, in a Cadillac eight. They left Butte 1 hour 45 minutes to the good and reached Missoula, 131 miles, more than 3 hours ahead of schedule. The average speed was 34 miles from Butte to Missoula, from Missoula to Wallace 22.5 miles, and from Butte to Wallace 26.8 miles. Between Missoula and Wallace, a loose wheel made it necessary for Thomas Thibodeau in a Reo to relieve. He reached Wallace, 135 miles, in 6 hours 2 minutes, 2 hours and 11 minutes ahead. Beck arrived 18 minutes later.

Spokane Courier in Collision

The eighteenth relay, 86 miles, took the letter into Spokane. Bud Moe, driving an Overland, arrived at 7:58 p. m., 2 hours 57 minutes ahead of schedule. The only stop was due to a collision at Coeur d'Alene, 7 minutes delay. The last 36 miles was made in 45 minutes. Harry L. Olive, Overland agent, was at the wheel for the next lap, 115 miles to Coulee City. He arrived to show a gain of 4 hours 5 minutes, making up an hour in the distance. Of this gain, 25 minutes was lost by

Mayor C. W. Gilbert, who was courier in a Case car to the next stop, Ellensburg, 121 miles.

The last stretch to Seattle was 131 miles. The car left Ellensburg this morning at 4:27 and arrived here at 11:09 a. m. The last relay was marked by a fatality, former state senator, G. E. Dickson of Ellensburg, being killed when an axle broke on the summit of the Cascades. He was attempting to make better time on a route other than that taken by the Yellowstone trail couriers.

APPERSON EIGHT AND SIX FOR 1916

Kokomo, Ind., June 19—The Apperson Bros. Automobile Co. will drop the four-cylinder car in 1916 and will manufacture only sixes and eights. The six chassis will be the same as the 1915 model. The body types will include a roadster with four seats, of which the two front seats are individual chairs. The new roadster body will be mounted on either the six or the eight chassis.

The eight motor, 3½ by 5, develops 55 horsepower, and is of the V-type mounted at a 90-degree angle, the cylinders being cast in fours. The car has a wheelbase of 128 inches and a tread of 56.

FRANKLIN DIVIDEND INCREASED

Syracuse, N. Y., June 19—The H. H. Franklin Mfg. Co. has increased the dividend rate on its common stock from a 6 per cent to a 10 per cent quarterly basis, the dividend payable July 1, being at the rate of 40 per cent per annum. In addition, the directors have voted to retire July 1 the small issue of preferred stock, amounting to \$130,450. Surplus funds on hand can be readily used for this purpose. The company will materially increase its 1916 output. A production of 3,800 cars is being planned for the coming season.



START OF 100-HOUR RELAY RUN OVER YELLOWSTONE PARK TRAIL, DAN BOONE, THE FIRST COURIER IN MOLINE-KNIGHT, LEAVING CHICAGO AUTOMOBILE CLUB PILOTTED BY THE AUTOMOBILE BLUE BOOK CAR

Studebaker Reduces Price on All Models for New Season

Six-Cylinder Now \$1,000 and Four \$885—Others Make Cuts

DETROIT, June 21—Sweeping reductions in the prices of its six-cylinder models and a considerable cut on the fours along with larger engines and more refined bodies and chassis mark the announcement of the new Studebaker models.

The six-cylinder roadster is now priced at \$1,000, and the seven-passenger touring car is \$1,050. Last season's five-passenger six was \$1,385 and the seven-passenger \$1,450. The four-cylinder touring car in the new series is to sell for \$885, as compared with \$985 last year. The roadster is \$850, and the previous one sold for the same figure as the former four-cylinder touring model.

There has been much standardization of the two chassis, and this is probably influential in the lowering of prices. The motors are both increased in bore from 3½ inches to 3¾ inches, with the stroke remaining at 5 inches. Most noticeable in the engine changes is the removal of the cross shaft at the front, and the new mounting of the generator vertically with spiral drive.

Parts More Accessible

The whole chassis has been gone over with the main idea of attaining greater accessibility of parts, and greater quietness has also been striven for. The bodies have better lines, and there is no suggestion of break between the smooth lines of the body and the slope of the hood.

The new Studebakers use a modified form of Wagner electrical system in connection with a Remy ignition distributor. A special and advantageous feature of the electrical system is the placing of the wiring junction box on the right rear side of the motor. Removal of its cover plate makes it a simple matter to get at all connections, and the wiring on the body is eliminated.

The wheelbase of both cars has been increased. It is 1 inch longer on the six—122 inches. The four is lengthened from 108 to 112 inches. These changes give more body room and leg room. Due to modifications in the suspension, the cars set lower, and the frame has been strengthened. Both cars are fitted with 33 by 4 tires.

On a modified four-cylinder chassis, the delivery car is fitted. This uses the same engine, and the chassis differences are only such as needed for such service.

FORD PLANT FOR TRACTORS

Detroit, Mich., June 19—Some day—exactly when Henry Ford does not know himself—there will be located about 7 miles from the city hall of Detroit, the new Ford plants, which will give employment to 20,000 or more men who will make

among other things from 500,000 to 1,000,000 of the new Ford farm tractors annually.

Between 1,000 and 2,000 acres of land have been secured by the Ford Motor Co., just beyond the city limits, near Dearborn and Oakwood, partly along the River Rouge and along the tracks of the Pere Marquette and Michigan Central railroads, for a site.

Upon part of this land there will be erected factory buildings, power plants, a blast furnace, steel mills and other shops and works, all of which will make up the new Ford works. A large part of the ground will be reserved for the erection of workmen homes.

Work will be started with the least possible delay as it is expected that many years will be required before the new industrial city is entirely completed. The main plants, such as the tractor factory, are expected to be ready for operation within a year or two.

When these new plants are completed, and possibly even before, it is the intention of the Ford company to operate the present plant in Detroit exclusively for the manufacture of the bodies, tops and parts to be used for the Ford cars, the latter all to be assembled in the assembling plants throughout the country.

It is Henry Ford's ambition to build a tractor and sell it at such a low price that no farmer will be too poor to purchase one.

DETAILS OF BRISCOE ANNOUNCED

Jackson, Mich., June 24—The Briscoe Motor Co. today comes out with full details of its new models, which are a four and an eight. The four-cylinder engine is entirely remodeled as compared with that used in the previous model, and though the car is a much better design throughout, the price has been reduced from \$785 to \$750. The eight-cylinder model is to sell at \$950, and being on the same chassis, either engine will go in either car. This interchangeability makes it possible for a man to buy a car equipped with a four-cylinder engine, and should he later decide that he would prefer the eight, the Briscoe company will sell him that engine for \$225 additional.

The new four-cylinder motor has the same stroke as the former engine—5½ inches, but the bore is larger. It is 3¾ inches as compared with 3½ inches in the older engine. The cylinders are cast in a block, and a very smooth outward appearance has been given the power plant which is said to develop 38 horsepower. The gearset is not in unit with it, but is suspended independently amidships. The eight-cylinder motor is of the Ferro design, already described in these columns. It has overhead valves.

The chassis has been lengthened from 107 to 114 inches, which gives considerably more room in the back seat. Cantilever rear springs are fitted which are a departure from the half-elliptics used previously. A noticeable change is in the using of two headlights in conventional manner instead of the single headlight in the middle of the radiator as in the previous car.

Larger tires are used, being increased from the 30 by 3½ size to 32 by 3½. The brakes have been changed from the double internal expanding variety to the internal expanding and external contracting form. The rear axle has been changed to a floating form. Three body types—roadster of the clover-leaf seating form, touring car and coupe—are to be had.

BUILDS 100 TRUCKS MONTHLY

Lima, Ohio, June 21—The original output of Gramm-Bernstein trucks up to last year, was twenty-five trucks per month, ranging from 2 to 6 tons. Up to the first of June, the company has quadrupled that output and today is producing and shipping 100 trucks per month. To accomplish this extra buildings were built. The domestic business alone has tripled and the foreign business has swamped the plant, it is stated.

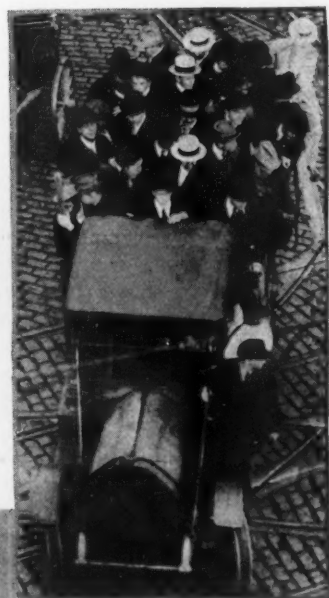
After turning down several very fine foreign orders on account of inability to fill them the concern finally arranged to obtain all of the raw material, as well as machinery, and will start in September with a fifty per cent increase on present output, which will give 150 per month.

DODGE BROS. MAKING ROADSTER

Detroit, Mich., June 21—Thus far Dodge Bros. has been building only touring cars, although the company announced quite a while ago that it would also supply a roadster at the same price as the five-passenger car. Orders for this latter model came in such quantity that for months all attention was given to the building of this style. Now, however, production has progressed to the extent of making it possible to take care of the demand for roadsters and the first of these models now are being shipped to dealers and distributors. The Dodge roadster differs from the Dodge touring car only as far as the body is concerned. It seats two passengers, but is otherwise identical in construction to the larger car. It sells at the same price, \$785.

ADMEN IN CONVENTION

Chicago, June 22—The annual convention of the Associated Advertising Clubs of the World opened last night with a mammoth parade. Truth in advertising is the keynote of the convention, which is divided into twenty departmentals and conferences for its meetings.



HOW CHICAGOANS MET WINDY CITY CAR STRIKE

EVERY motive means was resorted to by Chicago's army of downtown workers to reach their offices on time in the morning, and to get home at night in time to go to bed. The loop district hummed with throbbing motors and the cries of busmen. For once vehicles moved about without street car interference. The usual traction line straphanger was not disappointed; he found plenty of opportunities to stand in seatless buses

Chicago's Traction Strike Brings Buyers to Motor Mart

Denied Street Car and Elevated Service Business Men Bridge Gap with Emergency Motor Transportation—Save Commercial Stagnation



MOTOR VEHICLES SAVE DAY

Every place on car or truck that an extra passenger could stick to was utilized to the limit, and few accidents occurred

WITHIN a few hours after strike-bound Chicago awoke on the morning of June 14, the first worried frown gave way to a look of satisfaction, for the motor car solved the problem of how to get to and from work. S. O. S. calls began to tax the overburdened telephone wires leading to the windy city's motor mart. The burden of inquiry was: "Are you prepared to make immediate delivery?"

In keeping with the characteristics of the business man of the middle west metropolis, he arose to meet the occasion, realizing that some means of transportation must be furnished salesmen if business was to weather the storm and emerge sans paralysis. Consequently, the Chicago business man looked to the motor car industry to furnish adequate means for keeping his organization intact.

Bargain Counters Deserted

The bargain hunter in State street shops was conspicuous by her absence, but snugly ensconced in an easy chair, outside the pale of simple migratory means for taking advantage of Monday morning sales, she gave her orders in relays, clerks in various departments catering to her whims and fancies. This meant that department store and shop managers must have their coterie of

By William K. Gibbs

clerks on hand when the business day opened. Again, they must be taken home.

With the same stoicism that would have marked the attitude of Chicago business men had the strike continued for months, preparations were made to care for the transportation of employees to and from work. This demand materially increased the daily average of truck sales.

Dealers who were sold ahead for any length of time had to turn down orders for many cars. Inquiries that would have

been as good as money in the bank went shopping for takers who would promise immediate delivery. Almost anything that would move, immediately took on a market value. Cars that had been strangers to the city boulevards for many moons found eager purchasers, and once more became popular on the same stage where once they held the spotlight, only to be superseded by the march of progress.

After canvassing the row for medium-priced cars for immediate delivery, late comers found the supply exhausted and sought cars that could be rented. One agency was offered \$7 a day rental for a Ford touring car.

Unique Buying Plans

The buying public offered some unique methods of payment, some having cash, others endeavoring to purchase on the installment plan. One man tendered a \$10 bill as an initial payment, but in the rush of demand, dealers did not throw discretion to the winds; they pursued the conservative policy the same as at any other time.

Unfortunately, the Dodge agency did not have any cars with which to make immediate deliveries. The local branch was sold 10 days ahead, but could have sold twenty-five or thirty cars during the 2½ days



AN IMPROVED DOUBLE-JITNEY BUS



THE FIVE-PASSENGER MOTOR CAR DOES TRIPLE DUTY

the strike lasted had the cars been available.

The Ford Motor Co. traced the sale of more than twenty-five cars directly to the strike. This was in addition to regular sales, and the demand came mostly from business houses that wanted cars for their salesmen and collectors.

The Chalmers Motor Car Co., local distributor for the Saxon, did a record business that virtually amounted to a house-cleaning. Some buyers of Saxons declared they had no intention of purchasing a car until notice of the strike came out, while others gave the strike as a determining factor in speeding up contemplated purchase. This company also sold a number of Chalmers cars, but in the main, it was the lower-priced car that held the greatest demand.

Several downtown department stores were negotiating with the Buick agency for the purchase of trucks when the strike was declared off. Several prior sales were made, however, and officials are of the opinion that had the strike lasted any length of time sales of both cars and trucks for them would have increased materially.

Distributors of the higher-priced cars, in some cases, believe that the strike acted as a retardant of sales, but the old law of compensation was invoked again—what the high-priced cars lost the medium and low-priced cars gained.

Dealers Conservative

The local Jeffery branch had several sales directly traceable to the strike, and a number of inquiries from persons who were evidently seeking to buy on the dollar-down-dollar-a-week plan. One man tendered a \$10 bill as an initial payment. He didn't get the car.

Hundreds of calls came to the Greer agency for cars to rent and also many inquiries for second-hand cars. Many cars were sold, the majority of inquiries coming from persons who were willing to pay from \$100 to \$300 for a used car that could be turned into cash after the strike at a loss of a few dollars; possibly at a small margin of profit.

The Republic Motor Truck Co. sold four trucks to ambitious jitney busmen. Those who bought took advantage of the opportunity to launch a transportation business—human freight while the strike lasted and a general hauling enterprise afterward.

Many amusing incidents marked the improvised transportation facilities during the traction tie up. An inclosed moving van backed up to the curb at a downtown corner, the driver, also being the conductor, got down, went around to the rear end of the van, unlocked the rear door and assisted his fares to the walk. The boulevards were packed with cars, motorcycles, bicycles and roller skaters; the other streets with trucks and slow-moving vehicles.

Operate on Prearranged Schedule

Mail-order houses and some of the department stores prepared for the strike several days in advance. They divided the city into sections, printed routes and time of cars and distributed this information to every employe, so that when the strike was declared, the plan was put into operation and little delay or inconvenience experienced.

Thousands of downtown workers found themselves at their desks and counters the first day of the strike several minutes earlier than usual. When they brought in their morning papers from the back porch, early risers got their first intimation that the strike was on. Denied street car and elevated service, those living near the boulevards congregated at street intersections or headed downtown, wistfully watching the usual procession of motors gliding past. Almost to a man, car owners gave the much-needed lift and consequently many workers were deposited in the loop several minutes earlier than they would have been had they used their ordinary means of transportation.

Some motorists insisted on taking workers to their places of business, while others set them down at convenient corners. Business houses sought out managers and employes who owned cars and these were pressed into service to take other em-

ployes to steam-road stations or to their homes.

There even was a sigh from some when the strike was over. These came from those who found more pleasure in riding downtown on the boulevards along the lake than crowded in a stuffy street car. Two would-be society women were picked up on the north side by an obliging driver. Another member of the fair sex was beckoned in a little farther down the avenue. The latter was on her way to a Michigan avenue hotel to address a club meeting. As she alighted from the car she turned to the other two passengers and said:

"I think it is fine the way the car owners have lent their assistance."

"Yes," spoke up one of the other women, "we've been out all morning carrying people back and forth," but she failed to note that the chauffeur was listening. The assumed air of a benefactor evidently was more than he could let pass unnoticed.

"That isn't so, madam," he interrupted. "My boss sent me out this morning and told me to give anyone a lift where it was needed. I picked these two women up just a few minutes before I did you."

When the car moved on, although the other two fares had not reached their destination, it had but one occupant—the man at the wheel.

ILLINOIS JITNEY PUBLIC UTILITY

Springfield, Ill., June 19—The jitney bus has been formally classified. It is now a public utility in Illinois. Henceforth in this state, its status is fixed and it must operate according to hard and fast rules, and regulations. No longer may it be a free agent, operating today and laying off tomorrow. It is now under the jurisdiction of the state public utilities commission. It must have fixed charges and fixed schedules for service. It must receive permission to operate and this permission can not be granted unless it is shown that its service is needed and that it promotes the convenience of the public.

The ruling of the commission was made following a petition filed by the Jacksonville Street Railway Co., against the L. F. O'Donnell Jitney Bus Co., of Jacksonville, requiring the latter to comply with the utilities act. It was contended that the jitneys operate in every manner under the terms of the law regulating public utilities and should be compelled to obtain a certificate of convenience and necessity before being permitted to operate. In line with the policy of the commission, certificates of convenience and necessity for jitney bus lines will not be granted where it is the intention to operate the lines parallel with the street car lines. The commission also holds that regulation by the utilities commission does not prevent additional regulation by city ordinance.

Velie, Crow and Thomas Announce New 1916 Models

Last-Named Company Re-enters Field with \$4,000 Car

MOLINE, Ill., June 18—A small six-cylinder Biltwel model selling at \$1,065 and retaining the fundamental features of the former \$1,595 car, is announced by the Velie Motor Vehicle Co., Moline, Ill. The general appearance of this car is better than that of the higher-price model marketed during the 1915 season, the body sides having been made smoother and the top line of the body given a more generous curve to the cowl.

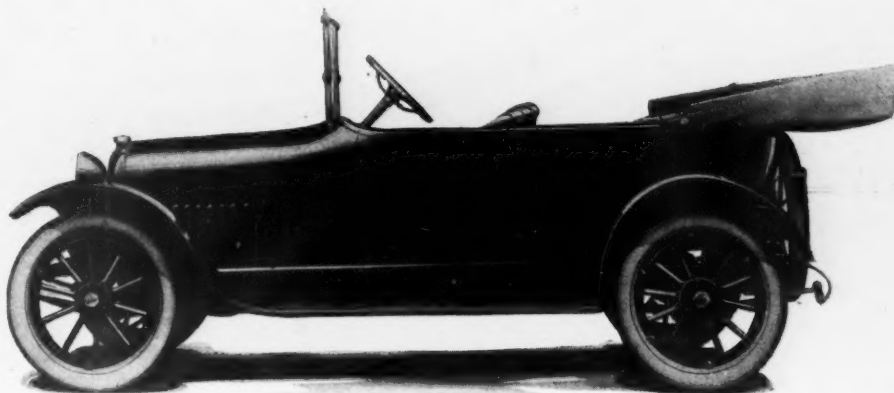
The new Biltwel motor is a $3\frac{1}{4}$ by $4\frac{1}{2}$, block-cast, Continental. It has a removable cylinder head, three-bearing crankshaft and has features used in other motors of this make. A Remy two-unit cranking and lighting system is fitted, the starting motor being geared to the flywheel and the generator driven from the water-pump shaft. Ignition is by a Remy combination distributor and interrupter, the battery being the current source. An automatic advance feature is used this year.

The clutch is practically the same as that used on the large Velie. It is a dry-disk type inclosed in the flywheel and has one adjustment. A three-speed gearset is incorporated in the power plant, the whole being suspended by three points. Propeller shaft speedometer drive is used. The rear axle is a floating design with helical-bevel driving gears in the differential, the latter operating on roller bearings in a pressed-steel housing.

The wheelbase is 115 inches, tires 32 by 4 and in the equipment will be found a Stewart vacuum fuel feed system, foot rail, robe rail, one man top, trouble lamp, etc.

THOMAS AGAIN IN THE FIELD

Buffalo, N. Y., June 19—The E. R. Thomas Motor Car Co. is again active in the motor car field and announces a \$4,000 touring car called model MF. This is a six-cylinder model with a $4\frac{1}{4}$ by $5\frac{1}{2}$ pair-



NEW VELIE BILTWEL MODEL

The general chassis features are the same as the higher price car of the past season. The wheelbase is 115 inches and the motor a block Continental, $3\frac{1}{4}$ by $4\frac{1}{2}$

cast motor, three-speed gearset and floating axle with helical bevel gears. Wheels are wire 37 by 5 and equipment includes one-man top, ventilating windshield, Stewart vacuum fuel feed system, 12-volt electric cranking and lighting system, Hartford shock absorbers, etc.

The Thomas company proposes to build only about fifty of these cars yearly but each car will be a distinctive job built to the tastes of the purchaser. The bodies will be made in the Thomas factory.

CROW TO BUILD ONLY FOUR

Elkhart, Ind., June 19—The 1916 line of the Crow Motor Car Co. will consist of but one four-cylinder chassis, according to announcement from the factory. This means the large fours and sixes of the past season have been discontinued. The new chassis, called CE-30, is made in touring and sedan form, the former listing at \$725 which is \$425 lower than the larger car the concern has been marketing.

The 1916 car has a 112-inch wheelbase and is fitted with a $3\frac{1}{2}$ by 5 block motor,

thermo-syphon cooled and oiled by constant level splash. A multiple exhaust system is used to reduce back pressure. It is fitted with a 12-volt Disco cranking and lighting system, 32 by $3\frac{1}{2}$ tires, extra rim on rear carrier, muffler cutout, robe rail, etc.

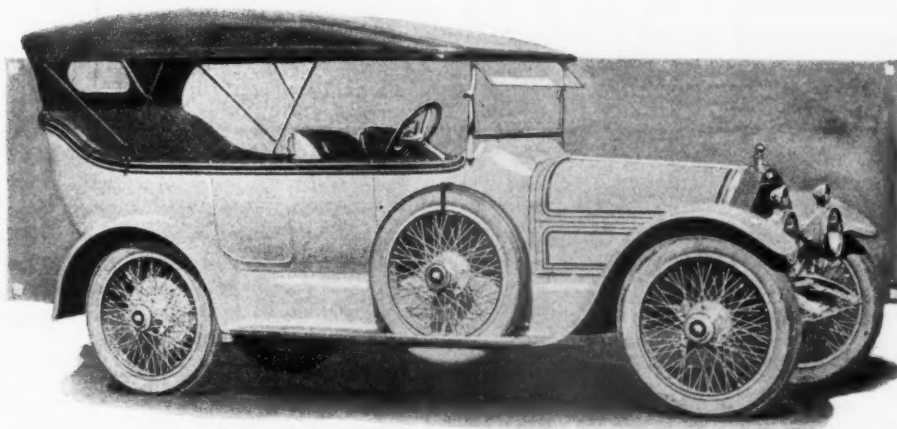
PULLMAN PLANS FOR BUSY SEASON

York, Pa., June 20—The creditors' committee, which has been in charge of the management of the Pullman Motor Car Co. for the past year, has been dismissed and the corporation has been restored to the original stockholders. The financial difficulties were straightened out without the aid of any new capital, the committee turning the material on hand into money by skillful management.

With the management again in the hands of the stockholders, plans for the 1916 season have been formulated. The new model, which will be produced shortly, will be changed materially. The wheelbase will be 4 inches longer and a Dixie magneto will be used. The car will be leather trimmed and equipped with 31 by 4 tires all around. The 1916 Pullman will be built in three types of bodies—five-passenger touring car, cloverleaf roadster and two-passenger roadster. It will list at \$740.

The company also is contemplating the production of a light delivery car, selling for about \$700, and a three-passenger coupe, equipped with the C. H. magnetic gearshift, to sell for \$990.

The company's plans call for a production of from 7,500 to 10,000 cars for 1916. The officers expect that one-third of the output will be marketed in foreign countries, this business being handled by the Exporters' Alliance, New York. Export shipments now are being made to England, Ireland, Norway, Sweden, Denmark, French West Indies, China, Ceylon, South Africa, South America and Canada.



NEW THOMAS MODEL FOR COMING YEAR

This is a six-cylinder type with a body built to the needs of the purchaser. The motor is a pair-cast design, $4\frac{1}{4}$ by $5\frac{1}{2}$



How to Get to Omaha and Sioux City Races

Seating and Parking Prices

DURING the next week, motorists of the middle west will be planning their trip to the Sioux City and Omaha races, July 3 and July 5, respectively. That they may be assisted in this, Motor Age gives herewith route information, road conditions on those routes that will carry the bulk of the travel, instructions for reaching the speedways after arriving at either of the two points, seating and parking spaces and prices.

Motor clubs and garages have responded generously to Motor Age's request for road information along the way. This data covers conditions right up to press time and comes from authentic sources, which have been given that the motorist making the trip may seek further information if he so desires.

The best routes within a radius of 250 miles of both Sioux City and Omaha are shown on the map herewith, marked in 50-mile circles, with Sioux City and also Omaha as the point of radiation. The transcontinental routes are all in good condition, except as noted in the data furnished by motor clubs and others as to certain local conditions.

The Sioux City speedway, which holds its race meet July 3; has covered stands that will care for about 12,000 persons, while the uncovered stands will seat probably 3,000. Charted parking spaces number 1,500, while there is three free parking spaces that will accommodate 10,000 cars.

HOW TO REACH SIOUX CITY TRACK

There are three routes from Sioux City to the Speedway. The Military Road is the most direct, but motorists have the option of taking the Highland Park and Riverside Park roads. Those wishing to use the military road, leave Pearl and West Fourth streets, following the latter to Riverside avenue, then turn west to Ross street. Drive north on Ross street to West Twenty-first street, then bear northwest over Military road direct to gate, crossing Big Sioux bridge, near yacht club.

All roads radiating from Sioux City are in good condition. The speedway is about $4\frac{1}{4}$ miles from the center of town.

Arrangements have been made to check cars when desired at the Sioux City track. This will be in the hands of competent persons. There will be ample hotel accommodations and special train and boat service to the track for those who do not wish to park their cars at the speedway.

The diagram of the track herewith will enable the motoring public to select the locations desired when ordering seats or parking spaces and order will be filled as nearly as possible with the locations requested. Checks, money orders and drafts should be made payable to the Sioux City Speedway Association. Box, grandstand and admission tickets will be forwarded to purchasers by registered mail.

Undoubtedly many of those who attend the Sioux City race July 3 will go to Omaha for the dedication of the new track there July 5. Inasmuch as such a short distance separates these two cities, the road conditions given on routes leading to Sioux City will be applicable to routes leading to Omaha. The map herewith shows the main-traveled routes to Omaha and it will be noted that separate circles of 50 miles each mark roads diverging from Omaha as well as Sioux City.

All stands at the new Omaha speedway are covered and each row of seats is elevated above the preceding one. The race at Omaha starts at 11 a. m., whereas the Sioux City race begins at 12:30 p. m. Reference to the diagram of the Omaha track

will enable ticket purchasers to decide which stand they wish to get tickets for and the prices prevailing in each stand is clearly shown on the diagram. Unlike most of the other speedway scales of prices, seat prices include gate admission. There is sufficient seating capacity for 20,000 in the grandstand. Infield parking spaces will accommodate 6,000 motor cars; re-

SIOUX CITY SEATING AND PARKING SPACE PRICES

Front row box seats, \$5 each; second row, \$4. Grandstand seats, \$2. General admission for these seats, \$2 extra.

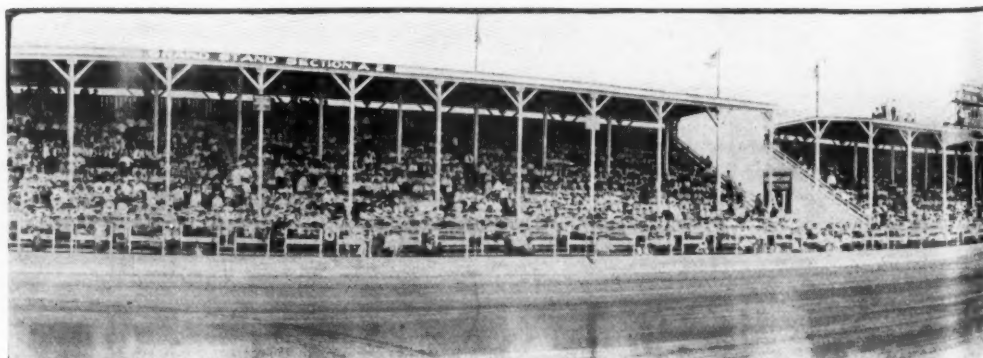
One stand near first turn of track, seats \$1, in addition to general admission. Bleacher seats, 50 cents.

Parking spaces range in price from \$5 to \$1. Inside track along homestretch, first row, \$5; second row, \$2.50; third row, \$1. Outside track, along homestretch, first row, \$5; second row, \$2.50. Backstretch has parking space free for \$1 gate.

served parking space will take care of 500 cars, and space inside the fence, other than infield is sufficient for 5,000 more cars.

In addition to prices for parking spaces, gate admission must be paid. The main grandstand gate, as shown in the diagram, is located at the terminus of the spur track of the Omaha & Council Bluffs Railway.

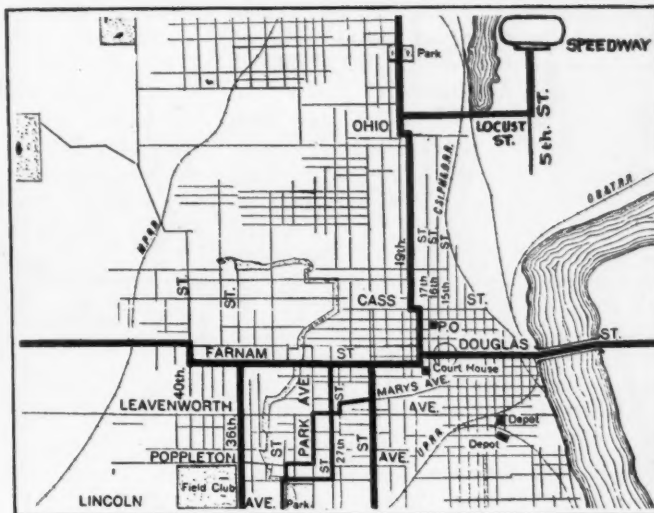
Tickets may be purchased at the gate, or at the downtown office at 1811 Farnam



DRIVERS LINED UP JUST PRIOR TO THE START OF THE 1914 300-MILE RACE



SECTION OF OMAHA'S NEW SPEEDWAY



MAP SHOWING ROAD FROM THE CITY TO OMAHA TRACK

street; also in Room 923, Woodmen of the World building, Omaha.

Payment for tickets reserved by mail should be in the form of money orders, checks, or drafts, made payable to the

tor bug seats" and these are expected to be in demand from those who wish to see the race from under the hoods of the cars.

The Omaha speedway is a fraction over 2 miles from the center of the city and transportation facilities have been arranged that will permit of ready accessi-

bility to the track for those who do not wish to drive their cars to the course. The main motor car entrance is located at the east end of the speedway, and ingress and egress to and from the infield is facilitated by a tunnel under the first turn of the track.

OMAHA SEATING AND PARKING SPACE PRICES

General admission, \$1 and \$2.

Grandstand seats, boxes A and H, \$3; B, G and F, \$4; D and E, \$5.

Box seats in all stands, \$7 each; box seats six persons.

Motor bug seats back of pits, \$2 each.

Parking spaces range from \$1 to \$10. Infield, homestretch, front row, \$10; second row, \$5. North side of infield, backstretch, \$1 in addition to \$1 gate admission per person. Free parking space on south side of infield for \$2 gate.

Omaha Auto Speedway Co. The management suggests that first, second and third choice be made. Tickets will be forwarded as soon as order is received. No money will be refunded, but in case of postponement all tickets will be honored.

Omaha has reserved a space with seats directly back of the pits for those interested in pit performances. Quite appropriately the management calls these "mo-

Best Roads to Sioux City and Omaha

Routes to Fourth of July Races from All Sections Within 250-Mile Radius of Each Temple of Speed

BELOW is given data on the routes as shown on the map on the following page. It will be noted that they are given to Sioux City only, but inasmuch as the Omaha race follows the Sioux City event with a lapse of but one day, it is assumed that most of those who tour any distance to the July 3 race undoubtedly will go to the Omaha race on July 5. Reference to the map will show two routes from Sioux City to Omaha, motorists having the option of going via Fremont on the west side of the Missouri river, or taking the road on the east side of the river. Both are good roads, although the west side route is a little the best, and the distance of a little over 50 miles will make a nice Sunday trip. Following this general data, local conditions in the vicinity of the es-

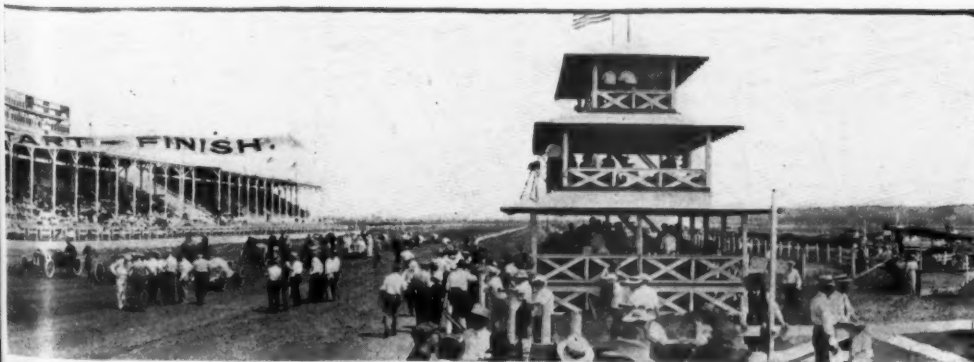
tablished routes, as shown on the map, are given, as reported by motor clubs and garages throughout the middle west.

Chicago to Sioux City

This route is very direct and follows the Lincoln highway nearly all the way, passing through DeKalb, Clinton, Cedar Rapids and Marshalltown to Denison, Iowa. Here you leave the Lincoln highway, going northwest to Sioux City—539 miles.

St. Louis to Sioux City

From this point there are two routes about equally good in road conditions and with very little difference in mileage. One is across Missouri via Mexico, Columbia and Marshall to Kansas City. From here go north via Hiawatha and Nebraska City to Omaha, and then on along the west side of the Missouri river to Sioux City. There



AT SIOUX CITY, IA., AWAITING THE WORD THAT STARTS THEM ON THEIR WAY

HOW TO GET TO OMAHA SPEEDWAY

Take any street to Nineteenth street, turn north and follow Nineteenth street to Locust street. Turn east to Fifth street, then north on Fifth street to main entrance. Roads will be well sprinkled and free from dust. Flagmen will be stationed on all streets leading to the speedway.

is an option to this route between Kansas City and Sioux City on the east side of the Missouri river all the way, but we do not believe it is quite as good as the west side route. All of the road from St. Louis is dirt, except about 100 miles between St. Louis and Kansas City, where considerable macadam has been put in. The other route from St. Louis is to go north on the west side of the Mississippi river, passing through Hannibal, Quincy and Keokuk, and here go northwest in an angling direction across Iowa, passing through Ottumwa and Des Moines, picking up the Lincoln highway at Boone. This is followed to Denison and then to Sioux City.

From Eastern Kansas to Sioux City

People starting for the races from as far south as Wichita and Newton will find two optional routes, one via Emporia, Topeka, Hiawatha and Omaha, the other over the Meridian road almost straight north through Salina, Belleville and York to Columbus; then east on the Lincoln highway to Fremont and north to Sioux City. There is not much difference in distance, but we believe the conditions

better on the route via Topeka, as there is more travel this way and the roads as a whole are kept in better shape.

Twin Cities to Sioux City

The most direct route is via Mankato and Spirit Lake. We believe that it is the best, although there are other options with slightly increased mileage. In southern Minnesota there is considerable gravel, but for the most part all of these roads are dirt, in excellent shape, and well cared

for in dry weather. They are dragged after rains.

Omaha to Sioux City

There are two routes from Omaha to Sioux City, one on either side of the Missouri river, but since the road on the west side of the river has some advantages over the one on the east side, motorists are advised to take that road. Either one, however, is negotiable and the distance is a little over 50 miles.

What They Say Along the Way

THE following data on road conditions is up-to-the-minute information received from the motor clubs and garages along the established routes. The source of information is given that motorists may secure additional information while making the trip if they so desire.

From Owatonna, Minn.

Roads from Owatonna to St. Paul are very good with the exception of one hill known as Walcott hill about 17 miles from Owatonna. However, there is a road leading around this hill that is in fairly good condition. The road is all graveled and will be in number one shape by the time of the

races. The proper route to take is the Red Ball which goes through Medford, Faribault, Dundas, Northfield, Farmington and Rosmond, from there direct to St. Paul. The road from Owatonna to Mason City which is traveled from here by the way of Austin is in fairly good condition and the roads from Owatonna to Winona, via Rochester, will be in good condition by July 1.—George A. Klemmer.

From Mason City and Spencer, Ia.

Road conditions between Mason City and Spencer, Ia., are good. This is a gravel road almost all the way.—Mason City Automobile Co.

From Prairie du Chien, Wis.

Condition of road between Prairie du Chien and Mason City, Ia., is very good. The trip



MAP SHOWING TOURING ROUTES TO OMAHA AND SIOUX CITY

can be made from McGregor to Mason City without shifting gears. By July 3 to 5, barring rainy weather, roads will be of the best. The road is marked with a red cross on telephone poles from Milwaukee via Madison, to Prairie du Chien then on to Mason City, Ia., and is very good all the way.—Harris Auto Co.

From Belleville, Kan.

The condition of the highway between Belleville and Columbus, Neb., is good. The same also true of the road between Belleville and Wichita.—Postmaster.

From Emporia, Kan.

Road conditions between Emporia and Hiawatha at present are very poor, owing to the high waters in the northeast part of the state. Road conditions between Emporia and Newton are excellent.—Newton Bros.

From Marshall, Mo.

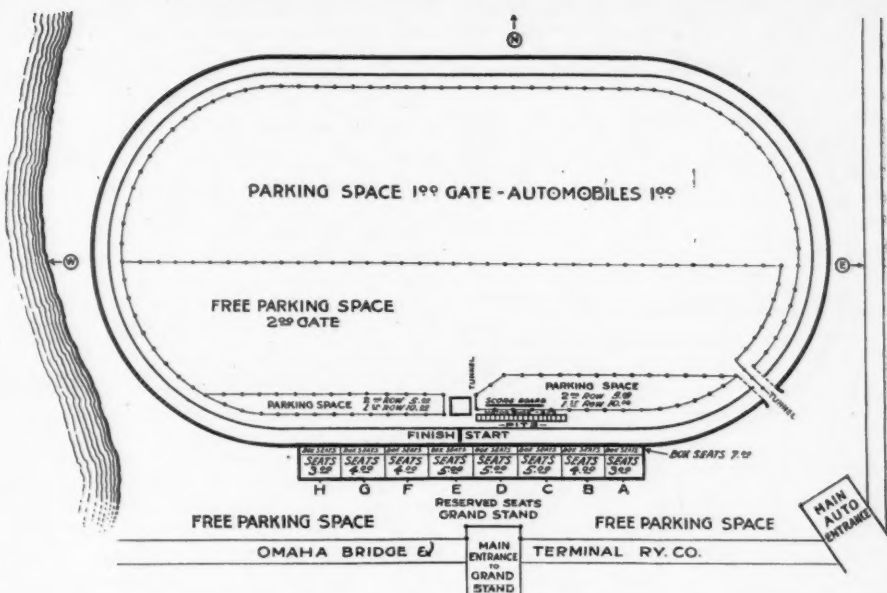
We have been having considerable rain the last 30 days and the roads are not as good as they might be, although there are hundreds of tourists passing through daily who are not meeting with very much trouble. Between Columbia and Marshall the road is in a better condition than between here and Kansas City. A new ferry has been installed at Arrow Rock with the best of accommodation and shortening the route between Columbia and Marshall about 20 miles. There has been a good road graded on both sides of the river to and from the landing. Leave the old trail at New Frankfort and come west into Arrow Rock. The road between Marshall and Kansas City has been graded and looked after very closely, but owing to a heavy rain 2 weeks ago, there were two bridges washed out between Lexington and Kansas City, but they are detouring around this bridge at the present time without much difficulty, and they will have these bridges repaired within the next week.—W. F. Blasser, Blasser Bros.

From Hiawatha and St. Joseph.

Between Omaha and Hiawatha and St. Joseph, the roads are good, and barring rain there should be no difficulty in getting to either Omaha or Sioux City. Roads to Omaha from Ottumwa, Des Moines, Sioux City and Marshalltown are very good and dragged regularly. Road from Grand Island is over the Lincoln highway and this is always in good traveling condition. From St. Joseph, Kansas City and Hiawatha, take the Nebraska side.—S. E. Smyth, Secretary, Omaha Automobile Club.

From Madison, Wis.

The roads between Madison and Prairie du Chien and between Madison and Dubuque are very good dirt highways and are in excellent condition at the present time. The road between Madison and Freeport, Ill., is a very good motor road. In fact, the main traveled

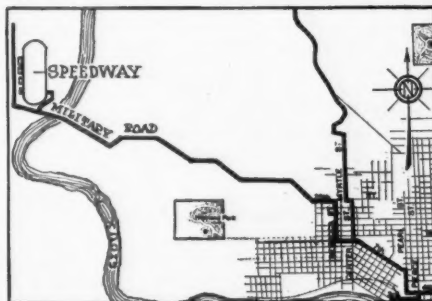


PLAN OF OMAHA, NEB., 1 1/4-MILE COURSE

roads in this section of Wisconsin are kept in very good condition all during the summer.—L. F. Schoelkopf.

From Mitchell, S. D.

Highway condition between Mitchell and Sioux Falls is good. This is known as the Scenic highway and is in first-class condition.



ROUTE FROM SIOUX CITY TO SPEEDWAY

tion. It passes through Mitchell, Chamberlain and into the Black Hills country, and for the greater part of this road is good. As soon as it stops raining the Scenic highway will be in first-class condition from Sioux Falls to the Hills country. It has rained practically all the time this spring and been hard to get roads in proper condition. T. J. Morgan, Secretary, Mitchell Commercial Club.

From Sioux City.

The condition of the highway between

Sioux City and Fort Dodge is excellent. Between Sioux City and Omaha is very good, and motorists will have no trouble in motoring from Sioux City to Omaha after the Sioux City event July 3 to witness the Omaha event July 5. Our roads in this section are in good condition. After a hard rain the sun dries them in a very short time and motorists experience little or no trouble.—A. B. Beall, General Manager, Sioux City Speedway Association.

From Freeport and Davenport.

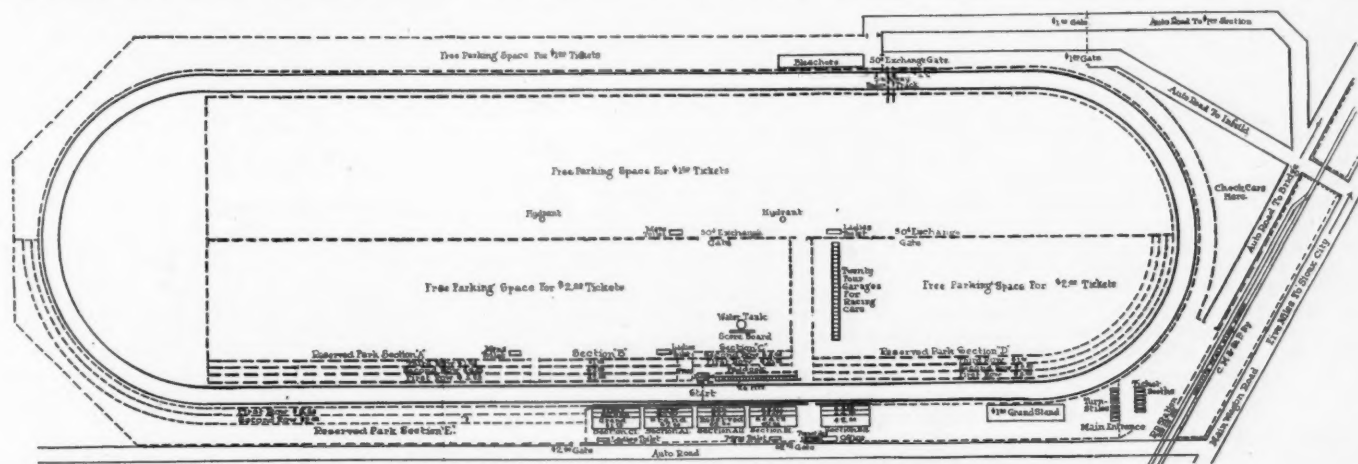
Roads between Freeport and Rockport and Dubuque are poor and rough; between Freeport and Davenport, fair.—Bljou Garage.

From Kansas City

Roads between Freeport and Rockford and dependence and St. Joseph; also from here to Omaha, as practically impassable just at present owing to hard rains, but are good ordinarily. If the weather is good during the week preceding the Omaha and Sioux City races these roads will have time to recover.—Automobile Club of Kansas City.

From Des Moines, Ia.

We have had some very heavy rains with the result that roads between Des Moines and Mason City, St. Joseph and Omaha are muddy and in several places washed out, but these roads, in the course of the next week, when the road working forces have had time to repair damages, will be in good shape. Ordinarily the River-to-River and White Pole roads between this city and Omaha, the Twin City route to Mason City, and the Mt.



DETAILED DIAGRAM OF THE 2-MILE SPEEDWAY AT SIOUX CITY, IA.

Ayr trail to St. Joseph, are in excellent condition—about as good as it is possible to make dragged dirt roads.—George Botsford, Secretary, Des Moines Chamber of Commerce.

From Spencer, Ia.

Road conditions between Spencer and Sioux City are good. Some rain in the last two weeks made the road rough, but dragging has put in back in normal shape.—Postmaster.

Latest Telegraphic Information

From Cheyenne, Wyo.

Cheyenne, Wyo., June 22—Special telegram—The Lincoln highway through western Nebraska and Wyoming is in excellent condition. Just enough rain to settle the dust.—Cheyenne Motor Club.

From Omaha, Neb.

Omaha, Neb., June 21—Special telegram—Iowa and Nebraska roads into Omaha, barring any more rain, will be good by the time motorists are ready to come to the races.

Will become normal again in a day or so after rains. Little serious damage from recent cloudburst. Settled weather assures tourists good traveling.—S. E. Smyth, Secretary, Omaha Automobile Club.

From Kansas City, Mo.

Kansas City, Mo., June 21—Special telegram—Road conditions around here are bad at present but are improving daily. If weather continues favorable until Thursday roads in all directions from Kansas City will be good and there will be no necessity for detouring from regularly established trails to Omaha and Sioux City.—Automobile Club of Kansas City.

From Sioux City, Ia.

Sioux City, Ia., June 21—Special telegram—Roads in this vicinity are in good condition and should not deter motorists who contemplate attending the race on July 3. The skies are cloudless and the sunshine makes us almost willing to guarantee tourists will find more than a sufficiency of dust about July 2 or 3.—A. B. Beall, General Manager, Sioux City Speedway Association.

Answers to Inquiries for Route Information

Grand Island, Neb.—Douglas, Wyo.

Gibbon, Neb.—Editor Motor Age—Would like to know the best route between Grand Island, Neb., and Douglas, Wyo.—H. B. Dunkin.

Grand Island to North Platte via Alda, Wood River, Shelton, Gibbon, Lexington, Gothenburg and Bignell to North Platte. This is a section of the Lincoln highway, fair-to-good dirt roads. From North Platte to Big Springs via Sutherland, Paxton, Ogallala, and Brule to Big Springs. This is also a section of the Lincoln highway, fair-to-good dirt roads. From Big Springs continue to Chappell, over the new Chappell cut-off, and from Chappell to Cheyenne via Lodgepole, Sidney, Potter, Kimball, Bushnell, Neb.; Pinebluff, Wyo., to Cheyenne—natural prairie road with some good graded dirt. From Cheyenne to Douglas via Ft. Russell Reservation, Quinley's Ranch, Chugwater, Wheatland, Uva, Hartville Junction, Glendo and Orin Junction to Douglas—fair-to-good natural roads.

Complete running directions will be found in volume 5 of the Blue Book, published by the Blue Book Publishing Co., Chicago. Price \$2.50.

Great Falls, Mont.—Chicago

Great Falls, Mont.—Editor Motor Age—I desire to motor from Great Falls, Mont., to Chicago, via Omaha. Kindly give me the best route, and also state where I may secure maps of the route.—Ed Henen.

From Great Falls to Whitehall via Helena, Clancy, Jefferson, Boulder, Whitehall. From Whitehall to Livingston, over the National Parks Transcontinental highway, via Logan, Manhattan, Belgrade, Bozeman, Chestnut to Livingston. Here, if desired, the motorist may make the visit to Yellowstone Park which will be open to motorists on August 1. This may be accomplished by running from Livingston to Emigrant and thence to Gardiner. This is simply mentioned as a side trip. From Livingston to Billings, via Big Timber, Reed Point, Columbus, Park City, Laurel to Billings. From Billings to Miles City, via Huntley, Pompey's Pillar, Custer, Forsyth, Cartersville to Miles City. From Miles City to Dickinson, N. D., the road over this route is bad in wet weather, via Terry, Fallon, Glendive, Wibaux, Yates, Mont.; Beach, N. D.; Sentinel Butte, Medora, Belknap to Dickinson. From Dickinson to Bismarck, via Richardton, Antelope, Hebron

New Salem, Mandon to Bismarck. From Bismarck to Fargo via Burleigh, McKenzie, Steele, Dawson, Tappan, Cleveland, Windsor, Jamestown, Spiritwood, Sanborn, Valley City, Oriska, Wheatland, Mapleton to Fargo. From Fargo to Brookings, S. D., via Hickson, Christine, Wahpeton, N. D.; White Rock, S. D.; Wheaton, Ortonville, Minn.; Milbank, S. D.; Altamont, Clear Lake to Brookings. From Brookings to Sioux Falls via Dell Rapids. From Sioux Falls to Sioux City, Ia., via Canton, S. D.; Beloit, Ia.; Hawarden, Westfield. From Sioux City, Ia., to Omaha, Neb., via Sioux City, Neb.; Homer, Oakland and Tekamah. From Omaha to Des Moines, Ia., over the Great White Way, via Council Bluffs, Oakland, Atlantic, Stuart and Van Meter. From Des Moines to Davenport via Prairie City, Monroe, Oskaloosa, Washington, Columbus City and Muscatine. From Davenport to Chicago via Moline, Ill.; Hillsdale, Sterling, Dixon, Rochelle, De Kalb, Elmhurst and Maywood. Running directions and maps will be found in volume 5 of the Blue Book.

Imperial, Neb.—Springfield, Ill.

Imperial, Neb.—Editor Motor Age—Kindly give me the best route from Imperial, Neb., to Springfield, Ill.—A. B. Reader.

From Imperial to Hastings, Neb., via Wauwata, Culbertson, McCook, Indianola, Bartley, Cambridge, Arapahoe, Oxford, Atlanta, Holdredge, Minden, Hastings. This is over dirt roads the entire distance. The section from McCook to Holdredge is likely to be bad after heavy rains, but from Holdredge on it is an excellent dirt road. From Hastings to Lincoln, via Fairmont, Exeter, Friend, Milford, Emerald to Lincoln. From Lincoln, Neb., to Council Bluffs, Ia., via Havelock, Waverly, Ashland, Gretna, Millard, Omaha, Neb., to Council Bluffs, Ia. From Council Bluffs to Creston, Ia., via Glenwood, Malvern, Hastings, Red Oak, Staunton, Villisca, Corning to Creston. From Creston to Ottumwa, Ia., via Afton, Murray, Osceola, Woodburn, Lucas, Chariton, Russell, Melrose, Albia, Blakesburg to Ottumwa. From Ottumwa to Burlington, Ia., via Batavia, Fairfield, Lockridge, Rome, Mt. Pleasant, New London, Middletown to Burlington. From Burlington, Ia., to Galesburg, Ill., via Oquwaka, Ill., Monmouth, Coldbrook to Galesburg. The road from Burlington to Galesburg is bad in wet weather. From Galesburg to Peoria via Knoxville, Brimfield, Kickapoo to Peoria. From Peoria to Springfield via Dillon, Delavan, Middletown to

Springfield. Running directions in volumes 5 and 4 respectively of the Blue Book.

Sioux Falls, S. D.—Middlesboro, Ky.

Sioux Falls, S. D.—Editor Motor Age—Kindly give me a route from Sioux Falls, S. D., to Middlesboro, Ky.—D. L. McKinney. From Sioux Falls to Sioux City via Canton, S. D.; Beloit, Ia.; Fairview, S. D.; Hudson, Hawarden, Ia.; Akron, Westfield to Sioux City. From Sioux City to Omaha via South Sioux City, Homer, Winnebago, Walthill, Lyons, Oakland, Craig, Tekamah, Blair, Calhoun, Florence to Omaha. From Omaha to Des Moines, Ia., via the "Great White Way" over a fine dirt road; from Omaha continue through Council Bluffs, Oakland, Lewis, Atlantic, Wiota, Anita, Casey, Stuart, Van Meter to Des Moines. From Des Moines to Davenport over a section of the "Great White Way," via Prairie City, Monroe, Oskaloosa, Rosehill, Sigourney, Harper, Washington, Columbus City, Columbus Junction, Fredonia, Muscatine, Sweetland Center, Pleasant Prairie, Blue Grass to Davenport. From Davenport to Ottumwa via Moline, Ill.; E. Moline, Silvas, Geneseo, Sheffield, Princeton, Hollowayville, Seatonville, La Salle to Ottumwa. From Ottumwa to Joliet via Morris and Minooka to Joliet. From Joliet to Valparaiso via New Lenox, Frankfort, Ill.; Dyer, Ind.; Schererville, Merrillville and Deep River to Valparaiso. From Valparaiso to Logansport via North Judson, Winamac, Star City, Royal Center to Logansport. From Logansport to Indianapolis via Deer Creek, Cairo, Burlington, Middlefork, Kirklin, Augusta to Indianapolis. From Indianapolis to Louisville via Columbus, Waynesville, Jonesville, Seymour, Crotherville, Scottsburg, Henryville, Sellersburg, New Albany, Ind., to Louisville, Ky. From Louisville to Middlesboro via Bardonia, Springfield, Danville, Crab Orchard, Mt. Vernon, Barbourville and Pineville to Middlesboro. This latter stretch from Crab Orchard to Middlesboro, while not impassable, is in very bad condition and not recommended. Running directions in volumes 4 and 5 respectively of the Blue Book.

Peoria, Ill.—Detroit, Mich.

Peoria, Ill.—Editor Motor Age—Kindly outline the best route from Peoria, Ill., to Detroit, Mich., also the condition of roads during the month of July.—C. Spindler.

Peoria to Ottawa via E. Peoria, Washington, Metamora, Washburn, Varna, Mount Palatine, Lowell. This is over good dirt and gravel roads. Then Ottawa to Joliet via Morris and Minooka. This is over stone and gravel road, with a few miles of dirt before reaching Morris. From Joliet to Valparaiso via New Lenox, Frankfort, Ill.; Dyer, Ind.; Schererville and Merrillville. Good stone and gravel road. From Valparaiso to Laporte via Westville—macadam road, some of it worn. From Laporte to Niles via Hudson Lake—macadam and gravel. From Niles to Detroit via Pokagon, Dowagiac, Paw Paw, Kalamazoo, Comstock, Galesburg, Augusta, Battle Creek, Marshall, Parma, Jackson, Ann Arbor, Ypsilanti and Wayne—mostly fair-to-good gravel roads, with some stretches of sand.

Complete running directions will be found in Blue Book, volume 4.

Long Prairie, Minn.—Quinn, S. D.

Long Prairie, Minn.—Kindly give me the best route from Long Prairie, Minn., to Quinn, S. D. Quinn is on the Pierre-Rapid City route. Also state distance.—R. F. Knapp.

From Long Prairie to Sauk Center, thence to Glenwood and Benson. From Benson to Ortonville—a good road in dry weather, but bad in wet—via Appleton, to Ortonville. From Ortonville, Minn., to Brookings, S. D.—good road in dry weather, bad in wet—via Milbank, S. D.; Altamont, Clear Lake to Brookings. From Brookings to Pierre, S. D.—nat-

ural dirt roads, and as a rule kept in good condition by dragging—via Arlington, Lake Preston, De Smet, Manchester, Iroquois, Huron, Wessington, St. Lawrence, Miller, Highmore, Harrold to Pierre. From Pierre to Quinn—over the Deadwood trail—extreme caution must be used between these two points, and running directions in Blue Book followed carefully, owing to the lack of landmarks along this route—via Fort Pierre, Meers, Hayes, Ottumwa, Philip, Cottonwood to Quinn.

The approximate distance from Long Prairie to Quinn, S. D., is 529 miles. We have no running directions from Long Prairie to Benson, but from Benson to Quinn running directions are given in volume 5 of the Blue Book.

Rochelle, Ill.—Huron, S. D.

Lindenwood, Ill.—Editor Motor Age—Kindly give me the best route from Rochelle, Ill., to Huron, S. D.—Horace Stocking.

From Rochelle, Ill., to Clinton, Ia., via Ashton, Dixon, Sterling, Morrison, Unionville, Fulton, Ill., to Clinton, Ia. Then over a section of the Lincoln highway from Clinton to Cedar Rapids via DeWitt, Wheatland, Lowden, Mechanicsville, Mt. Vernon, Marlon to Cedar Rapids. From Cedar Rapids to Marshalltown via Belle Plaine, Chelsea, Tama, Montour, Butlerville, Marshalltown. Over the Lincoln highway from Marshalltown to Denison via Nevada, Ames, Boone, Ogden, Grand Junction, Jefferson, Scranton, Westside to Denison. From Denison to Sioux City, Ia., via Charter Oak, Mapleton, Holly Springs to Sioux City. From Sioux City, Ia., to Sioux Falls, S. D., via Westfield, Akron, Hawarden, Ia., Hudson, S. D.; Fairview, S. D.; Beloit, Ia.; Canton, S. D., to Sioux Falls. From Sioux Falls to Lake Preston, via West Sioux Falls, Colton, Wentworth, Madison, Romona, Oldham to Lake Preston. From Lake Preston to Huron via De Smet, Manchester, Iroquois, Cavour to Huron.

Rochelle, Ill.—Deming, N. M.

Flagg, Ill.—Editor Motor Age—Kindly give me the best route from Rochelle, Ill., to Deming, N. M.—Fred Rush.

Rochelle to Sterling—over a portion of the Lincoln Highway—via Ashton, Franklin Grove, Dixon. From Sterling to Davenport—good in dry weather—via Galt, Lyndon, Hillsdale, Watertown, Moline, Ill., to Davenport. From Davenport to Des Moines—over the Great White Way—via Blue Grass, Pleasant Prairie, Sweetland Center, Muscatine, Fredonia, Columbus Junction, Columbus City, Washington, Harper, Delta, Springfield, Okaloosa, Monroe, Prairie City to Des Moines. The Inter-State trail—via Somerset, Indianola, Medora, Liberty, Osceola, Leon, Davis City, Lamoni, Ia.; Eagleville, Mo., to Bethany—here take the new Inter-State trail cut-off to Kansas City, avoiding St. Joseph. From Bethany follow the marked poles through Pattonsburg, Cameron, Plattsburg, Trimble, Smithville, Nashua to Kansas City. From Kansas City to Osage City, Kan.—over the old Santa Fe trail—via Overland, Lenexa, Olathe, Gardner, Baldwin, Overbrook, Scranton, Burlingame to Osage City. From Osage City to McPherson via Admire, Allen, Council Grove, Herington, Lost Springs, Marlon, Hillsboro, Lehigh to McPherson. From McPherson to Dodge City—over the Santa Fe trail via Windom, Mitchell, Lyons, Great Bend, Dundee, Larned, Garfield, Kinsley, Spearville to Dodge City. From Dodge City to Amarillo via Meade, Plains, Liberal, Kan.; Tyrone, through edge of Guymon, Okla., then continue to Goodwell, thence Texhoma to Stratford. From Stratford—over the Borderland route—to Dumas, thence on to Amarillo. From Amarillo to Brownfield via Canyon, Happy, Tulia, Plainview, Hale Center, Lubbock, thence to Brownfield. From Brownfield, Tex., to Roswell, N. M., via Plains, Bronco, Tex.; Tatum, N. M., to Roswell. From Roswell to El Paso via the Borderland route—

through Hondo, San Patricio, Mescalera Indian village, Alamogordo, thence to El Paso. From El Paso to Deming via Canutillo, Tex.; Lanark, N. M.; Afton, Cambray, Myndus to Deming.

Running directions in volumes 4 and 5 respectively of the Blue Book.

Brady, Tex.—Indianapolis, Ind.

Brady, Tex.—Editor Motor Age—Kindly give me the best route from Brady, Tex., to Indianapolis, Ind.—E. E. Polk.

From Brady to San Angelo—over a section of the Puget Sound to Gulf highway—via Millersview, Paint Rock to San Angelo. From San Angelo to Abilene, Tex., via Miles, Balinger, Bradshaw, Guion and continuing to Abilene. From Abilene to Ft. Worth, Tex., via Baird, Putnam, Eastland, Ranger, Strawn, Mingus, Gordon, Mineral Wells, Garner, Weatherford to Ft. Worth. From Ft. Worth to Dallas, Tex., via Handley, Arlington and Grand Prairie to Dallas. From Dallas, Tex., to Oklahoma City, Okla., via McKinney, Melissa Station, Van Alstyne, Howe, Sherman, Denison, Tex.; Colbert, Okla.; Emet, Milburn, Mill Creek, Wynnewood, Purcell, Lexington, Noble, Norman to Oklahoma City. From Oklahoma City, Okla., to Arkansas City, Kan., via Edmond, Guthrie, Mulhall, Orlando, Perry, Ponca City, Newkirk, Okla., to Arkansas City, Kan. From Arkansas City to Florence, Kan.—a section of the Oklahoma, Texas & Gulf Highway—via Winfield, Douglas, Augusta, Eldorado, Burns to Florence. From Florence, Kan., to Kansas City, Mo.—a section of the Santa Fe trail—via Elmdale, Saffordville, Emporia, Waverly, Williamsburg, Ottawa, Edgerton, Olathe, Overland Park, Kan., to Kansas City, Mo. From Kansas City to Columbia, Mo., via Independence, Wellington, Lexington, Dover, Waverly, Marshall, Arrow Rock, Boonville, Missouri River Ferry to New Franklin, thence Rocheport and Columbia. From Columbia to St. Louis, Mo., via Millersburg, Calwood, Williamsburg, Mineola, Danville, Wright City, Foristell, Cottleville, St. Charles to St. Louis. From St. Louis to Terre Haute, Ind., via E. St. Louis, Collinsville, Highland, Pocahontas, Greenville, Mulberry, Hagerstown, Vandalia, Effingham, Martinsville, Marshall to Terre Haute. From Terre Haute to Indianapolis, Ind., over the National road—via Brazil, Harmony, Manhattan, Mount Meridian, Stilesville, Belleville, Plainfield, Bridgeport to Indianapolis.

Running directions will be found in volumes 4 and 5 respectively of the Blue Book.

Lima, O.—Pittsburgh

St. Marys, O.—Editor Motor Age—Kindly give the best route from Lima, O., to Pittsburgh, Pa. Would you advise using the Lincoln highway, or is there a better route?—A. Herzog.

Motor Age advises using the Lincoln highway, as repairs are being made on the National road and will not be completed until the latter part of 1915.

From Lima to Canton, a distance of 159.3 miles, via Ada, Patterson Station, Upper Sandusky, avoiding Osceola to Bucyrus, Gallon, Mansfield, Olivesburg, Ashland, Wooster, Massillon, Canton, then via Louisville, Alliance, Salem, Columbiana, Unity, Darlington, Pa.; Beaver Falls, Rochester, Economy, Sewickley, to Pittsburgh, the entire distance being 261.1 miles over macadam and brick roads.

Complete details are given in Volume 4 of the Blue Book.

Apache, Okla.—Pittsburgh, Pa.

Apache, Okla.—Editor Motor Age—Kindly give a route from Apache, Okla., to Pittsburgh, Pa., via Kansas City, Mo.—A. Reader.

Leaving Apache drive via Anadarko, Virden, Chickasha, El Reno, Kingfisher, Hennessy, Enid, Kremlin, Pondereck, Jefferson, Renfrow, Okla., Caldwell, Kans., Duray, South

Haven and Wellington to Wichita, Kans., a distance of 275.0 miles over good dirt roads, then go from Wichita to Newton, 25.6 miles.

Follow a section of the Santa Fe trail, via Walton, Peabody, Florence, Elmdale, Cottonwood Falls, Saffordville, Emporia, Waverly, Williamsburg, Ottawa, Edgerton, Olathe, Overland Park, Kans., to Kansas City, Mo., 212.9 miles. All good dirt roads, excepting the last 15 miles, which is a fine stone road.

Going from Kansas City to St. Louis, 299.5 miles, route through Independence, Levasy, Wellington, Lexington, Dover, Waverly, Marshall, Arrow Rock, Boonville, New Franklin, Rocheport, Columbia, Fulton, Williamsburg, Warrentown, Wright City, Cottleville, St. Charles.

From St. Louis follow the old National road, 173.1 miles, through East St. Louis, Collinsville, Highland, Pocahontas, Greenville, Mulberry, Vandalia, Effingham, Teutopolis, Martinsville, Marshall to Terre Haute, Ind., continuing 70.4 miles on this road through Brazil, Stilesville, Plainfield to Indianapolis, Ind.

From Indianapolis, drive northeast 171.6 miles through Richmond, Ind., Gettysburg, O., Vandalia, Springfield to Columbus. On account of repairs between Columbus and Wheeling, via Zanesville, the best route is 153.4 miles via Hanover, Frazesburg, Dresden, Coshocton, Port Washington, Dennison, Franklin, Laceyville, Cadiz, Georgetown, Colerain, Bridgeport, O., Wheeling, W. Va., then from Wheeling continuing along the National road as far as Washington, Pa., through Canonsburg, Bridgeville, Carnegie, to Pittsburgh, 60 miles, over macadam and brick, excepting two stretches of 5 miles each, which are rough pike or dirt.

Blue Books Volumes 4 and 5 will be found valuable on this trip, and these may be procured of the Blue Book Publishing Co., 910 S. Michigan Ave., Chicago, Ill., at \$2.50 per volume.

Marion, O.—Cleveland, O.

Richwood, O.—Editor Motor Age—Kindly give the best route from Marion, O., to Cleveland, O., via Lodi, O., and from Cleveland, O., to Marion, O., via Sandusky.—J. L. Glick.

From Marion to Bucyrus, then through Gallon and Ontario to Mansfield, over good gravel or macadam roads. From Mansfield, via Epworth, Ashland, West Salem, Lodi, Medina, Brunswick, Strongsville, and Brooklyn to Cleveland. Good gravel and macadam to Ashland; fair to good dirt to Medina; balance asphalt, macadam and brick.

Returning via Sandusky: Cleveland to Sandusky, via West Dover, Lorain, Vermilion, Ceylon Jct., Huron, Rye Beach, then through Castalia, Bellevue, Republic, Bloomville, Lykens, Broken Sword, Bucyrus to Marion, O., over level country and good gravel or macadam practically all the way.

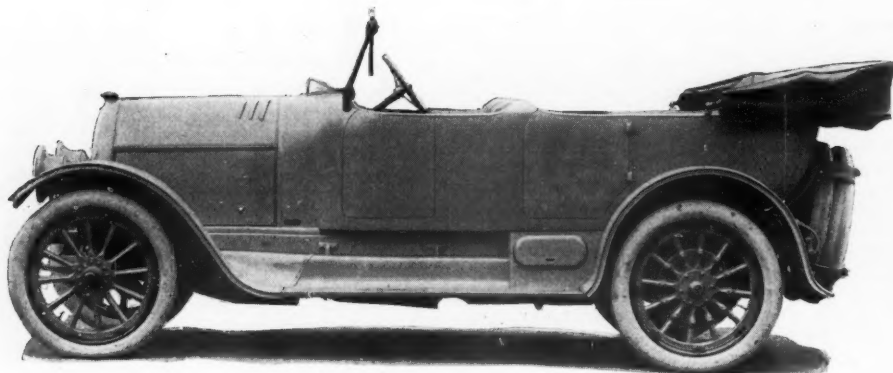
Chicago-Viola, Ill.

Chicago—Editor Motor Age—Kindly give me the best and shortest route from Twenty-first street and Michigan avenue, Chicago, to Viola, Ill.—W. A. Seeberg.

Start north on Michigan avenue to Jackson boulevard. Here turn west, and continue through Geneva, DeKalb, Rochelle, Dixon and Sterling, and thence over the Rock River road through Hillsdale and Watertown to Moline. When you get to Moline, Fifth avenue and Fifteenth street, do not turn right across the Mississippi to Davenport, but continue straight ahead to Rock Island, Third avenue and Twelfth street. Here turn south on Twelfth street and continue through Milan to New Windsor. Viola is but a short distance west of New Windsor on the Burlington line. All of this trip from Chicago to New Windsor is fully described in volume 4 of the Blue Book.

Radical Chassis, Body and Universal Changes in 1916 Fiat

Four and Six Identical, Except for Motors; Price, \$4,850 and \$5,350, Respectively



1916 FIAT SHOWING NEW BODY DESIGN

FEATURES OF THE NEW FIAT

Chassis and body design entirely new

Ball and socket steering connection

Sliding block at forward end of universal shaft

Chrome-nickel steel forgings

Four-cylinder motor 5.125 by 6.75; six-cylinder, 4.4 by 5.9.

THE Fiat Automobile Co., Poughkeepsie, N. Y., has brought out a new four-cylinder chassis and substituted entirely new body designs. The changes made have been in the universal, which has a sliding block at the forward end of the shaft, to compensate for longitudinal motion of the rear axle, and in the ball and socket steering connections.

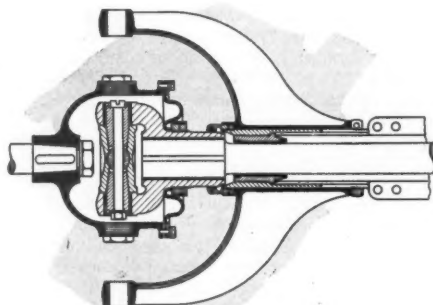
Selection of Materials Distinctive

It is in the selection of materials that the Fiat is distinctive. One of the points which stands out above all others is in the use of hardened-steel bushings against hardened-steel pins at places where only medium duty is required. This applies to such parts as the valve guides, steering connections, etc. Chrome-nickel steel is used in nearly all the important forgings throughout the car, examples being the crankshaft, steering parts, gearset parts and in fact all forgings which have to bear any stress of importance.

Two standard models are manufactured, known as type 55, four-cylinder, and 56, six-cylinder. These are identical in every respect, with the exception of the motors. The four-cylinder model was added in 1912 and has been continued ever since with only the minor refinements noted. The cylinder dimensions of the four are 5.125 by 6.75, and of the six 4.4 by 5.9. Both have block castings and the leading feature of

each is the simplicity with which the details of construction have been worked out.

The pistons have four rings at the top and are slightly convex in shape. They are double-webbed across the head. The bearings for the piston is formed by a bushing in the upper end of the connect-



TORQUE TUBE YOKE AND UNIVERSAL

ing-rod and this is an interesting point of where steel against steel is used. Naturally the question of lubrication is of prime importance to avoid any tendency of seizing, and this has been specially guarded against, as will be pointed out. The connecting rods are drop-forged I-beams and the crankshaft in the four-cylinder model is carried on three main bearings. On the six, the crankshaft has four main bearings. These are lined with babbitt in aluminum boxes, with bronze containers, which have a fillet holding the babbitt. The bearings are scraped into place by hand and are adjustable by means of shims.

Cams Eyed and Pinned to Shaft

Actuating the valves, there is a camshaft which has the cams keyed and pinned to it, operating directly on a roller follower on the pushrod. This is carried within a steel bushing above, which is the adjustment point for allowing clearance below the valve stem. The valve action is covered, as shown at C, by a substantial plate removable by the knurled nut G. A feature of the valve is that the angle of

the seat is 30 degrees, in place of the conventional 45, this being done to give a quicker and wider opening, for the same amount of lift.

Force Feed, Non-Splash Lubrication

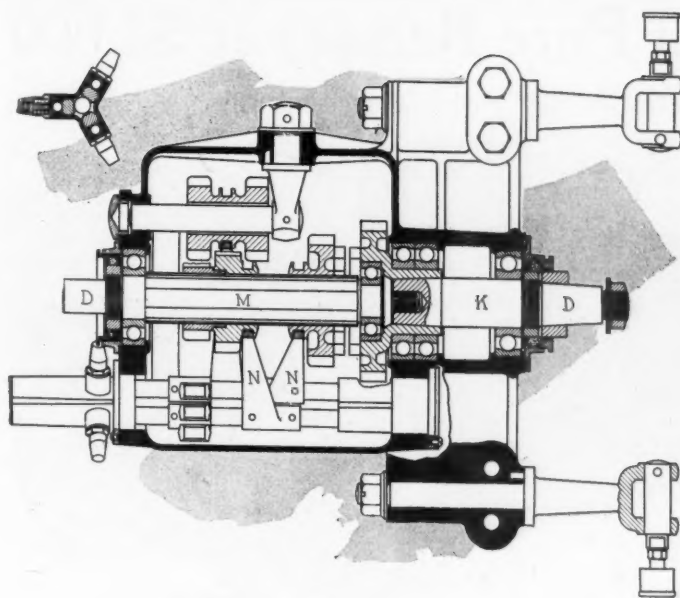
As would be expected with the use of many steel-against-steel parts, the lubrication is force-feed non-splash. The crankshaft is a hollow design, both for lightness and to facilitate the pumping of oil through the center. The oil pump is a gear design operated from the rear end of the camshaft carrying the oil from the reservoir in the bottom of the crankcase to a horizontal copper pipe in the case itself. This horizontal pipe extends from one end of the case to the other. From the pipe are leads to each of the main bearings of the motor. The oil passes around the main bearings and entering the hollow crankshaft is forced along its entire length until it reaches the cranks, the cheeks of which are drilled, allowing a passage for the oil to the hollow crankpins. Here the oil, under pressure, reaches the lower connecting-rod bearings and in addition is forced upwards along a tube to the wristpin bearings, which are oiled copiously, as required by the steel pins against the steel bushings at this point. An interesting feature is the use of integral baffle plates B, which prevent an excess of oil being thrown into the cylinders, thereby causing carbonization and smoke. The crankcase capacity is 5 gallons.

Water Pump and Magneto Drive

The water pump and magneto are driven off the opposite ends of a transverse shaft located at the forward end of the motor. The driving shaft for the two units is carried on ball bearings and are driven through spiral gears. The entire drive for this shaft is inclosed and runs in a bath of oil. Flexible couplings are used in the drive.

Sixty-five disks are used in the clutch, thirty-three driving and thirty-two driven. The single clutch spring introduces the pressure on the large amount of bearing surface and the whole engagement runs in oil and is contained in an oil-proof housing. There is a packing box surrounding the centrally located spring container, which prevents the oil from leaking from the housing, a feature of the clutch is the provision for alignment by allowing the forward end of the carrier shaft to extend into the rear end of the crankshaft. It is there supported upon a bushing of spherical shape, which is held by another bushing supported on threads in the end of the crankshaft. A ball and socket support is thus provided.

Four speeds are provided by the compact gearset. The design is distinctive, as the mainshaft M which connects



CROSS-SECTION
DESIGN OF 1916
FIAT GEARSET

with the clutch at the extremity D extends the length of the gearbox proper, being carried on ball bearings at either end. The stubshaft K at the rear end of the gearbox connects with the universal and thence transmits the drive through the propeller shaft. Chrome-nickel steel gears and shafts are used and all together there are seven rows of ball bearings. A double row is used at the inner end of the short shaft K, through which all the power is transmitted. The shaft end is four-splined and carries upon it the sliding units actuated by the shifter forks N.

Gearset Housing in Two Parts

The housing for the gearset is in two parts and is made from an aluminum casting. The mainshaft is carried in the upper half of the housing and the bearings are mounted between the two parts at their junction. The top of the gearbox forms a large cover plate and all connections are milled to form a close juncture and thus prevent oil leaks. A heavy horizontal web is formed in the gearbox and in this are mounted the trunnion supports for the carrying the forked yoke at the forward end of the propulsion tube which surrounds the propeller shaft.

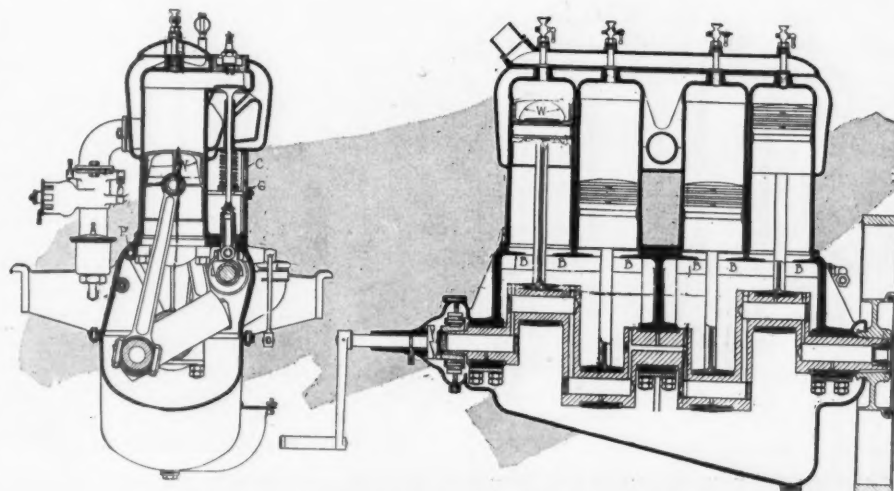
The Fiat rear system is distinctive in the employment of a solid pressed-steel rear axle housing and torque tube combined. The housing is made from two stampings manufactured at the Turin, Italy, factory of the Fiat organization. One stamping forms the top half and the other the bottom, and the weight of the two is close to 80 pounds combined. The bevel drive differential and the axle shaft are carried on four P. I. V. annular ball bearings, and a double set of these bearings support the pinion fitted to the rear end of the propeller shaft.

The ball type steering knuckle and spindle is a refinement which is found in the Fiat cars and although it has been incorporated in both models for some time was not in the original model first put out

by the Poughkeepsie concern. The ball and socket joints at the end of the tie rods also aid in providing easy steering and at the same time the car weight is carried on a ball thrust bearing beneath the upper jaw of the knuckle. These parts are lubricated by grease cups and of a design which gives great durability.

Four and Six Wheelbases Same

The wheelbases of both the four and six are the same, being 116 inches, with standard tread. The equipment is complete, including Bosch electric lighting and starting and a full line of accessories, including speedometer, clock, demountable rims, etc. The new body as fitted to the standard chassis has a front door width of 19 inches, rear door 22 inches, width between tufting at the front seats 43 inches, and width of rear seat between tufting of 46 inches. It is a molded design with no abrupt interruption of the contour, but made in a gradual sweep from radiator to the end of cowl, thence to the secondary cowl sweeping back to the rear end of the tonneau with a gradual slope which lends a low, long appearance to the entire design. The



TWO SECTION-THROUGH VIEWS OF THE 1916 FIAT MOTOR

price of the Riviera model, fully equipped on the 55 or four-cylinder car, is \$4,850. On the type 56, six-cylinder chassis, the price is \$5,350.

REO DIVIDEND INCREASED

Lansing, Mich., June 18—In addition to the regular quarterly dividend of 2½ per cent, the directors of the Reo Motor Co. declared extra dividend of 12½ per cent, making a total cash dividend of 15 per cent, or \$450,000. A similar cash dividend is expected to be announced in October. The Reo motor truck will announce a cash dividend shortly, it is said.

DE KALB CAR MAKES DEBUT

St. Louis, Mo., June 18—A new delivery car—the De Kalb has been put on the market. The initial product of the De Kalb Motor Car Co., of St. Louis, appeared on the streets here a few days ago. It is a 45-horsepower, six-cylinder, with standard parts. It is priced at \$2,250. The makers offer a choice of bodies.

The De Kalb is equipped with a Beaver motor, Apple starting and lighting system, Stromberg carburetor and Remy magneto. The rear axle is full floating Timken; semi-elliptic springs are used. The wheelbase is 130 inches.

PATTERSON PRICE REDUCED

Flint, Mich., June 18—For 1916, the W. A. Patterson Co. will continue its model 4-32, which will be listed at \$995, \$100 less than in 1915. The car will be practically the same in general construction as this year's model, except that it will have a more roomy body for five passengers and will have other improvements as to comfort and style. The company will not bring out an eight-cylinder model, as had been rumored.

ORDERS BENHAM DIVIDEND

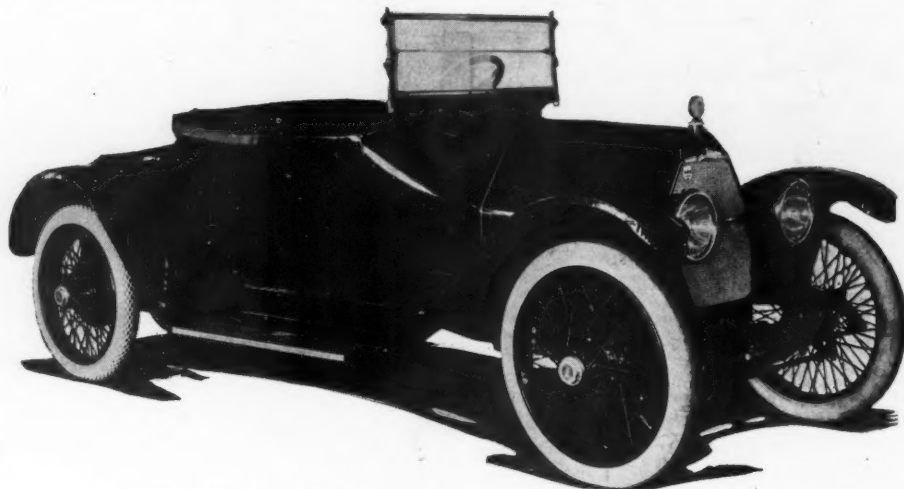
Detroit, Mich., June 18—Referee in Bankruptcy Lee E. Joslyn has ordered paid a first dividend of 10 per cent to the creditors of the Benham Mfg. Co. This will amount to \$2,500.

New Lewis VI Improved But Price Remains at \$1,600

1916 Model Embodies Six-Cylinder Motor and Other Features

FEATURES OF THE LEWIS VI

*Six-cylinder motor, 3¼ by 6
Wheelbase, 135 inches
Stewart vacuum feed
Vulcan electric gearshift
optional
Remy ignition, lighting and
cranking
Power tire pump on gearset*



NEW LEWIS VI ROADSTER SHOWING HOW TOP DISAPPEARS INTO BODY

WITHOUT a change in price, which remains at \$1,600, the seven passenger Lewis VI, made by the L. P. C. Motor Co., Racine Jt., Wis., is much improved over the former model. The most important change in the concern's plans is the adoption of the Vulcan electric gearshift as optional equipment at \$170 additional, and following this in importance is the change in the motor bore, which now is 3¼ instead of 3½. The stroke remains the same—6 inches. The oiling system now employs a plunger pump instead of the flywheel, as last year, the rear axle now is a floating type made by the Hess Spring & Axle Co., the gearset is a newly-designed three-speed type, the propeller shaft a tubular one with Spicer joints instead of solid and Remy battery-type ignition supplants the magneto of the past season.

Short Intake Manifold

The 1916 Lewis employs a horizontal type Stromberg carbureter instead of the vertical type and feeds directly to a passage in the cylinder casting instead of first through a short manifold. A number of other detail changes also have been made, among which may be mentioned the addition of a Stewart single-cylinder tire pump driven from the gearset, a tire pump hose box under the floorboards in front, making

the hose accessible by lift—a small door, the use of Stanwell rims instead of those employed previously, spiral-bevel axle gears instead of straight bevel and a general improvement of the body lines. This includes a trimming up of the radiator, which shows more curvature on top, and making the body sides flush. The cowl now is made of aluminum and has a new type of ammeter fitted. The wheelbase is unchanged at 135 inches.

Motor not Common to Other Cars

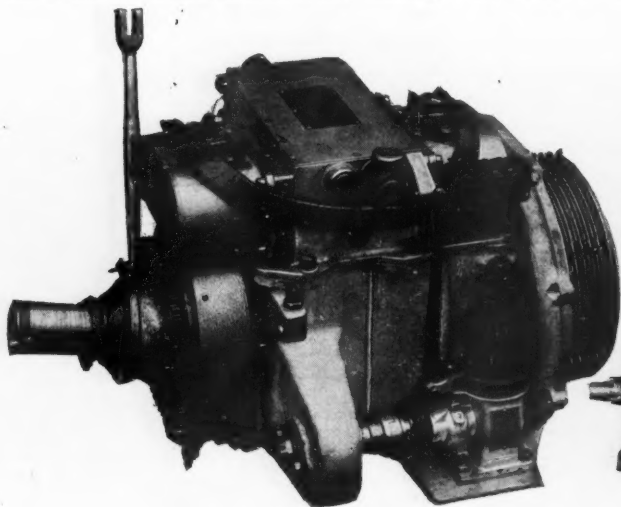
In the Lewis six motor are examples of design not used to any extent by other car builders, this being due perhaps to the fact that it was designed by a foreign engineer. The L-head cylinders are cast in block with the crankcase and flywheel housing, there being, of course, a bolted-on crankcase cover. The cylinder head is removable. On the right side of the engine is the Remy unit, which is coupled to the centrifugal water pump shaft. Behind the pump is a Remy combination inter-

rupter and distributor for ignition, the coil for ignition being attached to the timing gear housing, making wiring between the units, short indeed. Everything on this side of the engine is so low that access to the valves is quite free, much more so than in a great number of motors with three units on one side.

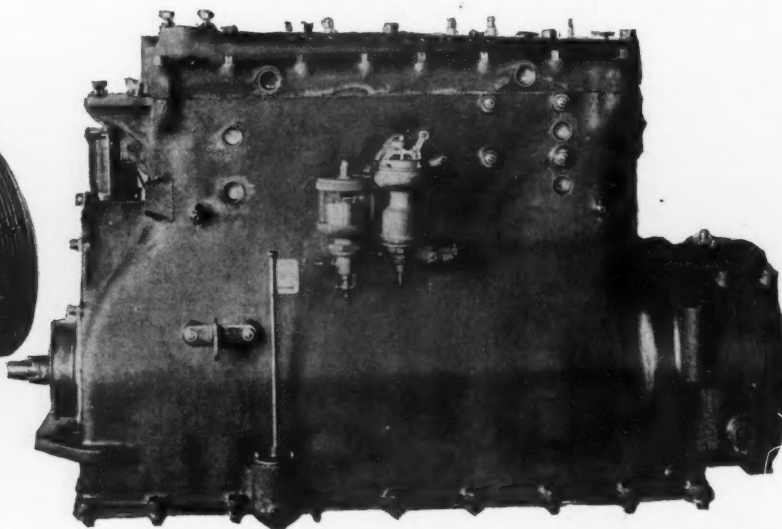
The only parts on the left side are the carbureter which now bolts directly to the casting, and an oil level gauge. Last year's motor was decidedly clean on this side and the carbureter change has added slightly to this and at the same time raised the instrument so that adjustments may be made more easily. A Stewart vacuum tank is used to feed the carbureter, the main tank being located at the rear.

Counterbalanced Crankshaft

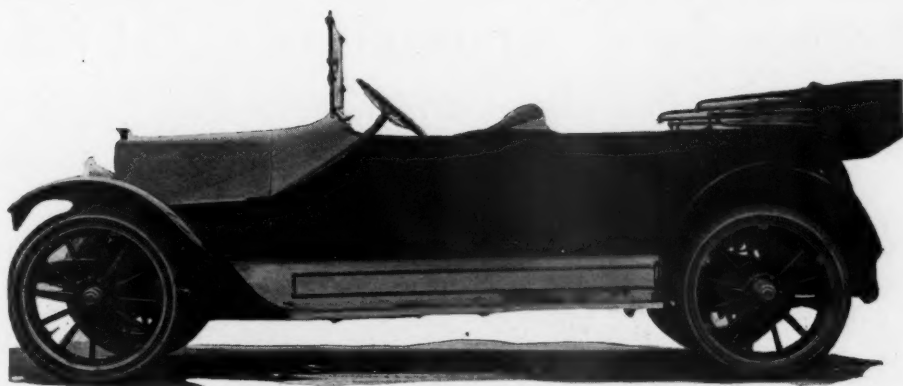
A three-bearing crankshaft with bearings of liberal size is used and drives the camshaft by means of a silent chain. The crankshaft is counterbalanced with weights, and this allows of the use of a



GEARSET AND CLUTCH OF LEWIS, SHOWING VULCAN ELECTRIC FITTINGS AND TIRE PUMP



LEWIS VI MOTOR IS UNUSUALLY COMPACT AND COMPLETELY ENCLOSED. THE CARBURETER BOLTS DIRECTLY TO THE CASTING



SEVEN-PASSENGER LEWIS VI, SHOWING STREAMLINE BODY

small diameter and lighter flywheel.

An important feature of the Lewis motor is the lubrication of its parts. This system, which now employs a plunger pump instead of the flywheel to force the oil on its rounds, is a combination force feed flywheel and splash, supplying not only the motor, but the clutch and gearset also. This means that the unit power plant has a common oiling system, the oil from one part being capable of flowing into the other. The main bearings are fed directly by leads and the cylinders and piston fed by splash. The valve stems, springs, guides, etc., are within the crankcase and are oiled continually by the spray within. This makes a neat and efficiency arrangement and adds considerably to the quiet operation of the motor.

Clutch Disk Design

The clutch is a disk design using fabric-faced steel disks, the whole running in oil, as mentioned previously. Behind the clutch is the new three-speed gearset, which in design is little different from the conventional. The gears for this season are made of chrome-nickel steel, it is stated. As the illustration herewith shows, the Vulcan electric gearshift unit is mounted on top of the gearbox. The control for this unit is on the cowl directly under the steering wheel. This is an improved installation and as has been told previously to Motor Age readers causes the gears to be shifted automatically when the clutch is operated, the operating media being solenoids. By pressing a button, indicating a given speed, the clutch at the next movement will cause the desired gears to be shifted and in this way different gear changes may be contemplated. The system was described in detail in a past issue of Motor Age. It will be noticed that the Stewart tire pump now is operated from the gearset. The tubing for the pump is run to a small box under the front floorboards and when a tire needs air the cover of this small box may be lifted. This makes a most accessible position for the air line and puts it out of the way when it is not needed.

The drive from the gearset is by the now open tubular propeller shaft, which, with its joints, is a Spicer unit, to a new floating rear axle fitted with spiral-bevel gears.

The axle housing is made of pressed-steel. Torque is taken by a bar.

Steering is by a nut-and-screw type post and braking by the usual means.

The body lines have been improved slightly by the elimination as far as possible of sharp corners. The front and rear seats are bifurcated, the extra seats being of the disappearing type. The equipment is quite complete.

PLAN DAILY OUTPUT OF 400 CARS

Flint, Mich., June 18—The Buick Motor Co., expects to build an average of 400 Buick cars daily when the new additions to the plant and the new machinery has been installed. During the past week more than 800 Buick dealers, sub-dealers and distributors have been at the plant. Between 150 and 175 came in a special chartered train from Minneapolis, Minn.; over 100 came from Ohio and large delegations came from Michigan, New York and other states.

The Motorists' Bookman

Porto Rico Past and Present

PORTO RICO and that vast, little-known, wonderfully fertile island, potentially the richest in the West Indies, which is occupied by the woefully mismanaged republics of Haiti and Santo Domingo, are ably described in A. Hyatt Verrill's, "Porto Rico Past and Present, and San Domingo of Today," published by Dodd, Mead & Co., price \$1.50 net. The author's excellent style, setting forth information derived from his own careful observations, should make this book of great interest to merchants, statesmen, travelers and possible colonizers.

One chapter devoted to transportation is of especial interest to motorists and tourists in general. It will be a source of satisfaction to know that in Porto Rico, whose area is approximately 40 by 100 miles, over 800 miles of well-graded macadam roads, excelled by very few

places in the world, connect the principal cities and towns.

History, people and their mannerisms, from the time Columbus landed in Porto Rico on his second trip across the Atlantic down to the present, are so blended as to make the book team with a compelling interest for the reader. The knowledge that in the black republic of Haiti such extremes separate the civilized and the barbaric seems incredible in a land so small and so near our own enlightened country.

Motor Body Building

Special interest attaches to the work of C. W. Terry in collaboration with Arthur Hall, in a treatise on the building of motor car bodies—Motor Body Building, published jointly by Spon & Chamberlin, 123 Liberty street, New York, and E. & F. N. Spon, 57 Haymarket, London, price \$3—in that it may be used as a textbook by students and as a reference by those engaged in that trade. Designs of various types of motor bodies with sealed working drawings, patterns and sweeps, in fact, everything from the initial framing to the finished body is embodied in this one volume. An appendix covers several pertinent subjects such as a glossary of technical terms in English and French, measurements of timber, the metric system, etc.

Gas Engine Theory and Design

"Gas Engine Theory and Design," by A. C. Mehrtens and published by John Wiley & Sons, contains some valuable information on gas engine construction, emphasis being laid on theory. The motor car engine is not dealt with as much as other types. It is purely a book for a student or an engineer wishing to improve in theory. Some of the chapters are as follows: Fuels, combustion, efficiency, designs, testing, and determining dimensions.



CLOSE UP VIEW DASH AND STEERING WHEEL

Mutual Motors Announce New Imperial Four at \$995

Roomier Five-Passenger with a 115-Inch Wheelbase

FEATURES OF THE 1916 IMPERIAL

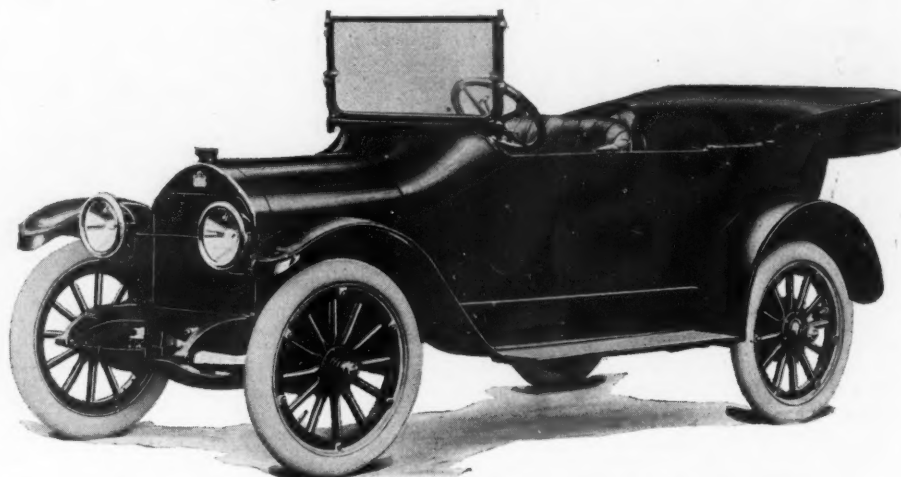
*Continental motor, 3¾ by 5
Clean design throughout
Special attention paid to finish
Westinghouse electric equipment
Anti-squeak strips used
Salisbury rear axle*

FOR 1916 the Mutual Motors Co., Jackson, Mich., will produce one model of the Imperial car and this is a four-cylinder with a 3¾ by 5 Continental motor and lists at \$995 as a five-passenger. The general impression received is that the car is a very roomy one, comparatively light in weight and well finished. It has a wheelbase of 115 inches, a disk clutch and three-speed gearset, floating axle and 33 by 4 tires.

In construction, the motor follows usual Continental practice, the lubrication being constant-level splash combined with pump. A large crankshaft is used, with the idea of eliminating vibration, and there are three main bearings of ample proportions. Though the conditions of the road trial on this car did not make possible any high speed it was observed that there practically is no vibration at any pace up to 35 miles an hour, and the engine did not then suggest by sound or otherwise that it was revolving at a great rate. It is geared 4 to 1 in the rear axle.

Westinghouse Electric Equipment

The electrical outfit is Westinghouse, with a unit generator and ignition and a separate starting motor, the latter meshing with the flywheel through the medium of a Bendix drive. The generator is driven by a shaft on the right side, and there is a substantial leather coupling, while, as is shown in the illustration, the ignition part of the machine is set vertically, containing an automatic advancing feature. It is to be noticed that the valves are all



NEW FIVE-PASSENGER IMPERIAL FOUR, WHICH LISTS AT \$995

accessible, as the generator platform is placed low enough to prevent the generator obscuring the tappets when the valve cover plates are removed.

Manifold Within Cylinder

Located on the opposite side to the valves is the Stromberg carburetor, this having a short intake pipe only, as the manifolding is carried out within the cylinder casting. Alongside the carburetor comes the oil-filling cap, placed where lubricant can be poured in without difficulty, and a gauge is used to register the amount of oil in the motor. There is no oil indicator on the cowl.

The inclosed disk clutch has alternate Raybestos-faced and steel plates and is proportioned to the torque to be transmitted so that the pedal action is not so heavy as usual. In fact, it is a very easy clutch to operate. Similarly, the gear shift is smooth and free, so that it is easy to control the gearset quietly and quickly.

Very long underhung rear springs are used, designed especially to give a Hotchkiss drive, so the propeller shaft is fitted with two universals, the speedometer drive being taken by gearing off the forward joint casing. Sometimes vibrations in the

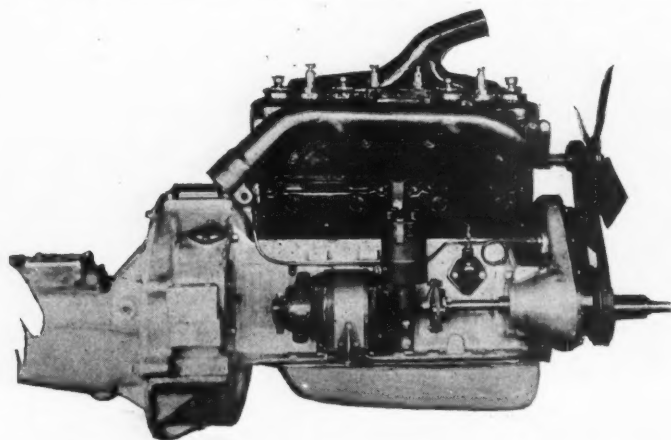
drive arise from the practice of taking the drive through the springs, and to guard against the possibility of such a happening, the Imperial rear springs have a particularly wide bracket for the attachment of the front ends of the springs to the frame. This, like other frame fittings, is hot-riveted in position.

The rear axle is a Salisbury, with straight-tooth, bevel gearing, and for the support of the pinion and the differential, ball bearings are used. The sleeves are carried through, inside the road wheel hubs, so that the weight is borne directly by a pair of Hyatt roller bearings. The upper half of the center case of the axle is detachable for inspection of the differential, this way of splitting an axle case leaves the lower portion a solid oil container that can not leak lubricant, by reason of failure properly to tighten a few bolts.

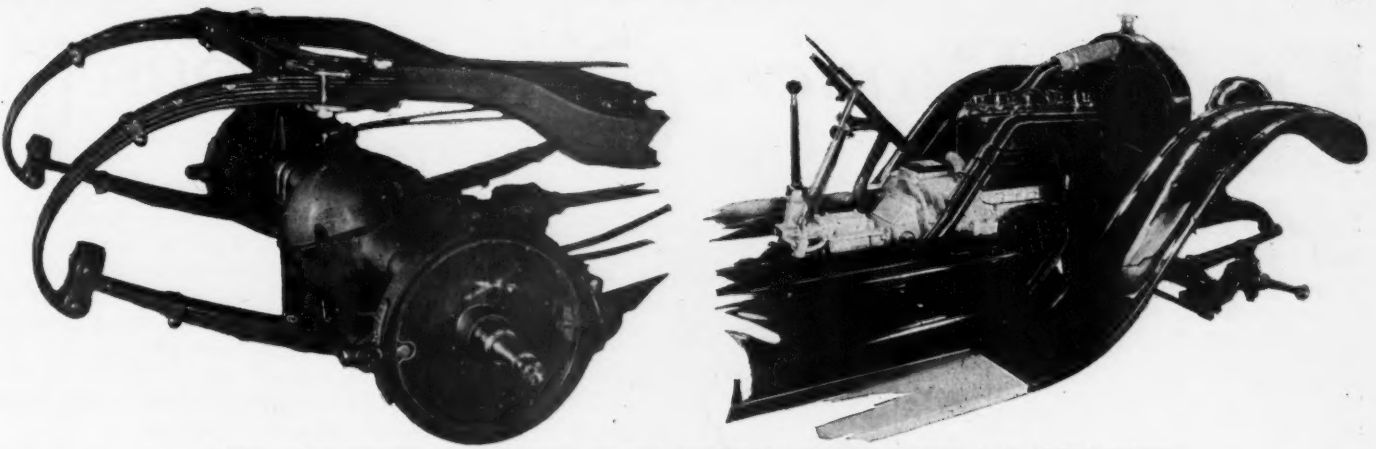
With an Eye to Accessibility

Front springs and steering gear layout is normal, but executed with an eye to the accessibility of the grease cups, which everywhere is excellent. A detail of the steering gear which, though not unique, is worthy of special mention, is the way in which the tie rod is lowered to clear the underside of the motor without putting a bend in the tube. A bent tube is less easy to set to a definite length and is more likely to distort than a straight one, so the Imperial uses a straight tube and drops it by means of forged hangers at each end. These small drop forgings are strong and rigid and also are neat in appearance. The frame is of heavy-gauge steel, designed for rigidity, so as to eliminate body squeaks and, further, to guard against noises of this character, the running board aprons have a felt packing strip beneath them, against the frame, and above them against the body.

In assembling the fenders and the



CONTINENTAL MOTOR ON IMPERIAL FOUR



LEFT, REAR SPRINGS SUSPENSION OF 1916 IMPERIAL; RIGHT, FENDER AND APRON WORK

aprons, a large number of bolts is used to secure rigidity and freedom from rattle on the road.

It has become so usual to say that a body is of streamline form and that it is roomy, that the phrases are losing their true meaning, but it is impossible to forego the remark that the Imperial body will hold five people of greater individual bulk than the majority of cars having the same passenger rating. As to its lines, they suggest space, and perhaps it is best described by saying that the complete machine has a presence. It is a car to catch the eye, though it might be hard to say

quite why this is so, were one pressed to particularize.

Completing the specificatory detail, the wheelbase is 115 inches and tires are 33 by 4 all round, on Detroit rims, a spare rim being included in equipment. The headlights have two bulbs for full and diminished illumination, and the switch is placed conveniently on the cowl board. In the cowl is the gasoline tank, which has a gauge the driver can read while at the wheel. Good upholstery with deep padding, a leather-covered back to the front seat, and a good carpet make for comfort in the rear compartment.

place by a taper pin passing through an existing hole in the crankshaft, a split pin holding this pin in the pinion.

Owing to the presence of the chain it is necessary to move the fan belt position further back and it is for this purpose that the pulley extension on the fan is provided. This extension pulley is simply driven on top of the old pulley after taking a slight cut over the flange.

Through the use of a change over starting switch the battery is connected to supply current at 12 volts for starting, though it is charged and the lamps are furnished with a 6-volt current. The starting switch is placed under the floor boards with a plunger pedal projecting near the base of the driver's seat, where it can be depressed by the heel.

Charging and discharging is indicated by a positive acting indicator clamped to the base of the steering column, which shows the words "On" or "Off." An automatic switch in the generator circuit cuts in the generator when the speed reaches 850 r.p.m. The lighting switch is provided with a dimming resistance for the headlights.

The complete installation weighs 150 pounds, of which the generator represents 38 pounds. Fitting can be accomplished by any repairman in 4 or 5 hours.

New Splitdorf-Apelco System for Fords

Single-Unit Lighting and Starting for \$65

A \$65, single-unit electric cranking and lighting system for Ford cars has been brought out by the Splitdorf Electric Co., Newark, N. J. It is a single-unit system, the motor-generator being designed for attachment to the left side of the engine, driving by a chain to the front end of the crankshaft. The aim of the design has been to reduce the number of parts to the minimum and simplify fitting to the engine. The complete outfit comprises the motor-generator, a 6 and 12-volt battery with case for mounting on the running board, an adjustable bracket for the motor, starting and lighting switches, chain and sprocket, fan belt and all necessary cables and clips.

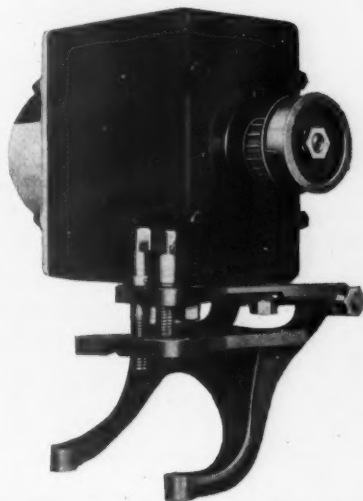
Practically no machining is necessary in fitting, exception being a slight cut on the existing fan pulley to take a pulley extension for the new belt by which the fan is driven from the end of the motor-generator shaft, instead of the crankshaft.

The cast-iron bracket which carries the motor is attached by three bolts, which replace two in the crankcase flange, and one at the base of the forward cylinder. The upper face of the bracket, as shown herewith, is hinged at one side for adjustment of the chain. For this purpose, two set screws are provided, one for raising and tightening the chain and the other for slackening. Great importance attaches to

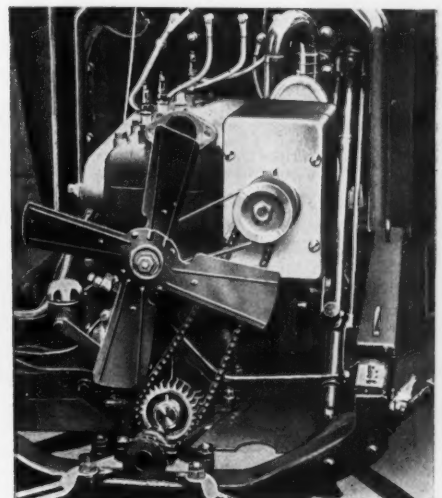
this feature on any chain-driven motor-generator set, as the drive is from opposite ends, in starting and lighting, and the strain in starting may be severe.

The gear ratio is roughly 2 to 1, the motor pinion and crankshaft pinion having respectively 13 and 27 teeth. There is no other form of gear, the drive being positive all the time.

In fitting, the present pulley on the crankshaft for the fan belt is removed and the chain pinion substituted. It is held in



SPLITDORF-APELCO MOTOR GENERATOR
Showing position on adjustable bracket. This bracket permits of chain adjustment



SPLITDORF-APELCO UNIT
Showing chain drive and drive for fan by belt from the motor-generator shaft



The Readers' Clearing House



EXPANSION OF ALLOY STEELS

Steel with 36 Per Cent Nickel Has Practically a Zero Co-Efficient

PORTLAND, Ore.—Editor Motor Age—What is the expansion in the metals ordinarily used in the manufacture of valves?

2—What is the average size, in cubic contents, of the combustion chamber of an internal combustion engine with relation to its horsepower?

3—What is the average pressure generated by the combustion of gasoline vapor in a cylinder?

4—What is the heat temperature at these pressures?

5—If a charge of gas were to be exploded in a tight receptacle, how long would the pressure of the combustion be maintained?—W. J. Ormsby.

1—There are two metals usually used for the manufacture of valves, namely, nickel-steel and tungsten-steel. The former, if made according to S. A. E. specifications, will contain from 28 to 35 per cent nickel. The expansion coefficient will vary from .00001131 per degree centigrade for the 28 per cent, to .00000085 for the 35 per cent. When the percentage of nickel reaches 36 the coefficient of expansion is less than that of any known metal and amounts practically to zero. The expansion coefficient of tungsten-steel is slightly greater than that mentioned for the nickel-steel and Motor Age is unable to get the exact figure for valve steel, which usually runs from 12 to 16 per cent tungsten.

2—The displacement of the motor is no exact measure of its power. As usually figured, it requires 8.5 cubic inches per horsepower at 1,000 r. p. m.

3—The explosion pressure depends upon the compression ratio of the motor and this pressure will run from 230 pounds per square inch for a 3 to 1 ratio to 460 pounds for a 5 to 1 ratio.

4—The temperature may run as high as 3,000 degrees F.

5—The pressure would be constant if the temperature of explosion was kept constant.

BRIEF SPECIFICATIONS OF CARS

Motor Dimensions, Valve Location, Ignition, Etc., Used

Helena, Okla.—Editor Motor Age—Is the motor, gearset, driveshaft, universal and rear and front axles manufactured or assembled of the following cars: Regal, Pullman 30, Chevrolet, Inter-State, Maxwell, Briscoe, Buick and Dodge?

2—Give the bore and stroke of the motor ignition and valve location. Give the type of rear axle.

3—Was there ever a test made of efficiency of the storage battery type ignition and the high-tension magneto? If so, what was the result?—A Reader.

1—Briscoe, Buick, Dodge, Maxwell, Chevrolet and Regal make most of the parts in their own factories. The others buy the units of outside concerns.

2—The data you wish is shown in the table herewith.

Motor Has Worn Parts

Lanark, Ill.—Editor Motor Age—I have a model 71 F Overland and the valve guides have side play and make a clicking noise. Is there

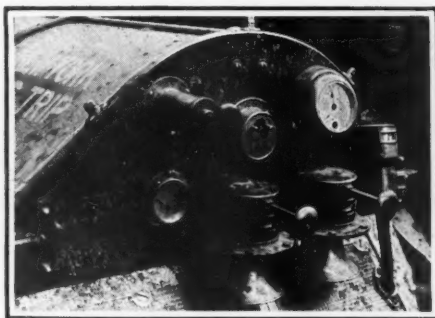


FIG. 1—ODD HORN ATTACHMENT

How E. J. Baker, who drove a Stutz car across the continent, attached two Stewart horns to his car. The horns are easily operated by foot instead of by hand

any way I can take this play up without taking down the motor and putting in a new guide? The motor was overhauled recently and I do not care to take it down again.—Subscriber.

The valve stem guides can be replaced with new ones without doing any more than removing the valves. Perhaps you mean the push rod assembly and if this is the case, you will have to take the camshaft out in order to get the new units installed. If badly worn, there is but one good thing to do and that is replace the worn parts with new ones.

RECONSTRUCTED AN OLD MAXWELL

Made 1909 Model Into Vehicle With Improved Appearance

Hutchinson, Minn.—Editor Motor Age—In Fig. 1 is shown a Maxwell car built in 1909, which was formerly a four-passenger car. I rebuilt this car this winter during my spare time, doing all the work myself. The material used did not cost over \$10.

The entire body was removed, also the fenders and the front seat of the old car is used on the present car.

The racy type front I cut from a sheet of 22-gauge galvanized iron and reinforced at the rear edge with a piece of V-iron bolted directly to the frame of the car.

The gasoline tank formerly was under the front seat and being square it was not used, but a new, round tank was made to hold about 12 gallons and hung at the rear of the car. This made it necessary to install some form of pressure-feed to get the gasoline to the carbureter.

Fearing the carbureter would not stand the pressure, I made a container and mounted it on the dash of the car. In this tank I used the valve and float of an old carbureter, which let about 2 inches of gasoline in the tank and then shut off. From this tank I ran a pipe lead to the carbureter. This makes an even pressure on the carbureter at all times.

The pressure pump is a bicycle foot-pump, fastened in under the dash, just at the left of the driver.

The weight has been reduced from 1,900 pounds to 1,600 pounds and the speed as great as one can travel on a country road.—Chester Hanson.

HORSEPOWER OF SOME MOTORS

Speed at Which Power Is Developed—Ford Makes Own Parts

Monticello, Ark.—Editor Motor Age—What is the horsepower of the following motors: Jeffery 1914 six, Chalmers light six 1915 model, Paige six 1915 model, Studebaker 1915 six?

2—What is the maximum speed of each of the above cars?

3—What is the second largest manufacturer of motor cars in America?

4—I have noticed Dodge Bros.' name on the gears, etc., of several Ford cars. Why is this when Ford claims to make all parts for the Ford cars?

5—Why does the Ford company no longer advertise the Ford car as one made of vanadium steel?—A Reader.

1—The Jeffery Chesterfield motor shows 40.25 horsepower at 2,200 r.p.m.; the Chalmers model 32 motor shows 47 horsepower at 2,200 r.p.m.; the Paige six, 48 horsepower at 1,750 r.p.m. The Studebaker company is opposed to giving out information of this character.

2—All of the cars you name will show about 50 miles per hour.

3—The Overland company is the second largest producer in America.

4—Up to last year Dodge Bros. made some of the Ford parts and you probably noticed the name on one of the older models.

5—It has discontinued this for reasons unknown to Motor Age.

SPARK PLUG PORCELAINS CRACK

Probably Struck by Wrench When Installed—Other Causes

Mason City, Ia.—Editor Motor Age—Upon examination of the spark plugs of a 1915 Jeffery Chesterfield six, I find that five of the six are cracked. The car has been driven about 1,300 miles and oil has been kept at proper level. The

BRIEF SPECIFICATIONS OF ELEVEN CARS

Car	Bore and Stroke	Ignition	Valve Location	Rear Axle
Regal, D.....	3.750x5.000	Atwater Kent	Left	3-4 Float
Regal, 8.....	2.750x4.500	Atwater Kent	Inside	3-4 Float
Regal, 4.....	3.375x3.750	.....	Left	Float
Pullman, Jr.....	3.750x3.250	.....	Left	3-4 Float
Chevrolet.....	3.687x4.000	Simms	Head	Semi-Float
Inter-State.....	3.500x5.000	.....	Head	3-4 Float
Maxwell.....	3.625x4.500	Simms	Right	3-4 Float
Briscoe.....	3.125x5.125	Spiltdorf	Right	Float
Buick six.....	3.250x5.000	Delco	Head	Float
Buick six.....	3.750x5.000	Delco	Head	Float
Dodge.....	3.875x4.500	Eisemann	Right	Float

motor is a high-speed Rutenbur. What is the cause of cracked porcelain?

2—Is it possible to remove carbon from cylinders by using alcohol one part to four of gasoline?

3—Does a vane oil pump develop any knock which is not noticeable except at about 15 miles or higher and not noticeable below that speed to any extent?

4—Is Mobiloil grade A a good grade of oil for a Rutenbur motor 3 by 5, six-cylinder?—M. O. Crawford.

1—The porcelains may have been defective and cracked easily because of the extreme heat. Possibly they became cracked when the plugs were screwed into the cylinders. Often poor handling of the wrench causes this.

2—Alcohol may be used as a carbon remover, but not in solution with gasoline. In the alcohol treatment the liquid is poured into the cylinders whose pistons are on top dead center. The cylinder must be very hot. The whole cylinder is filled with the alcohol and the liquid allowed to remain in over night. The next night two more cylinders are treated. It is cheaper and better to have the carbon removed by the oxygen treatment, which costs from 35 to 60 cents per cylinder and takes only a few hours.

3—This hardly is possible. The knock would be louder at low speed and at high speed would barely be audible.

4—Mobiloil Arctic is recommended by the Vacuum Oil Co., maker of the oil.

COMPARING MAGNALIUM AND IRON Former Is Much Lighter and Has Greater Tensile Strength

Halifax, N. S.—Editor Motor Age—Kindly explain why a motor will not stop when the current is switched off.

2—What is magnalium?

3—How does it compare with cast iron for weight and tensile strength?—J. E. Grant.

1—This usually is due to a short-circuit in the switch or carbon in the cylinders. In the latter case, the motor will fire, because the incandescent particles of carbon explode the gas.

2—Magnalium is the trade name of an alloy of aluminum and magnesium.

3—Magnalium is much lighter than cast-iron, which has a specific gravity range of from 5 to 7, approximately. Magnalium has a specific gravity of 2.5, so it runs at least 50 per cent lighter than cast-iron. Ordinary cast-iron for motor pistons runs 18,000 to 20,000 pounds tensile strength and magnalium about 23,000 pounds.

CARBONIZE MOTOR ACTS QUEERLY Heats Excessively and Has No Power on Hills—Bucks at Low Speed

Hubbell, Neb.—Editor Motor Age—Last October I bought a model 24, 1915 Buick. The water boils on the least amount of use, and I have to clean spark plugs nearly every 25 to 30 miles. After running 2 or 3 miles, on stopping the car it will buck and jump and then give an explosion as though the thing was going up in the air. I have had these troubles from the start. Can Motor Age suggest something to do? The car has but little power on a hill. The storage batteries test up good.—Buick owner.

Motor Age is inclined to believe that your trouble is caused by a carbon deposit, because too much oil was used. It is customary to slightly overfeed a new car and in a great number of instances the motor will require removal of its carbon in 300 miles. The fact that you must clean the spark plugs and the car has no power

on hills is additional proof that carbon is the cause of your trouble. A heavily-carbonized motor often will explode with the switch in off position.

Go to a good garage and have them remove the carbon and no doubt your troubles will cease.

CARBURETER FLOODS CONTINUALLY Float Stuck or Lever Bent—Condensation a Probable Cause

Mishawaka, Ind.—Editor Motor Age—The carburetor on my 1912 Flanders car is a puzzle. This carburetor leaks or floods about nine out of ten times when I stop and keeps it up till I start again. The other one time it will be dry as the Sahara desert all around the outside and top. This leakage occurs in spite of the fact that I have always strained my gasoline through chamolisk skin and had the carburetor taken down and cleaned and float shellaced by a competent repair man. Can Motor Age tell me what the matter is and how to remedy it? What kind and size carburetor would you advise if I decide to put on a new one?—William A. Sarle.

1—The leakage may be caused by condensation in the inlet manifold or by the float being stuck or improperly adjusted. It is probable that the float lever was bent when the instrument was dismantled in order to shellac the float. The fuel valve may not be seating.

2—There is no reason for changing carburetors simply because the present one is not properly tuned. If the maker of the carburetor has a service station in South Bend, send the carburetor there and have it put in good order. If there is no agent near you, send the carburetor to the Chicago branch.

COMPLAINS OF PITTED BREAKER Condenser May Be Broken Down or Points May Be Improperly Set

Milwaukee, Wis.—Editor Motor Age—I purchased a little less than 2 months ago, a Chevrolet Royal Mail roadster equipped with Connecticut ignition system. After running car about 3 weeks and a little less than 300 miles, it was necessary to replace contact points in breaker because they were badly pitted. Since then I have run about 400 miles more and they



FIG. 2—A TRANSFORMED MAXWELL
This is a 1909 model which formerly was a four-cylinder type and was reconstructed by a Minnesota reader of Motor Age

Questions Answered and Communications Received

W. J. Ormsby.....Portland, Ore.
A Reader.....Helena, Okla.
Subscriber.....Lanark, Ill.
Chester Hanson.....Hutchinson, Minn.
J. E. Grant.....Halifax, N. S.
M. O. Crawford.....Mason City, Ia.
A Reader.....Monticello, Ark.
Buick Owner.....Hubbell, Neb.
Herman Kokemueller.....Milwaukee, Wis.
William A. Sarle.....Mishawaka, Ind.
F. J. Pratt.....Clarkston, Wash.
R. W. Lilley.....Aurora, Ill.
John C. Pyle.....Salina, Kan.
Donald Harrington.....Holstein, Ia.
A Subscriber.....Cleveland, O.

No communications not signed with the reader's full name and address will be answered.

again need replacing. The one contact point was badly pitted and the other had a deposit of about 3-64 inch. Can Motor Age advise the cause of this trouble and what remedy would Motor Age suggest? Kindly let me know how far apart the contact points ought to be when separated? Please give this dimension in thousandths of an inch.—Herman Kokemueller.

It is possible that the wire leading to the condenser is broken or that the condenser itself is broken down. Also, if the points are set too close together frequent renewal will be necessary. Motor Age suggests that you take the unit to the Milwaukee agent for Chevrolet cars and have him examine it. The points properly set should be between .003 to .006 inch apart and there should be no arcing.

Pressure With No Outlet

Clarkston, Wash.—Editor Motor Age—What is the pressure per square inch on a 3-inch piston head at time of explosion, and how long would the pressure last if no outlet was supplied?—F. J. Pratt.

The pressure per square inch on a 3-inch piston may have any value within limits. The size of the combustion chamber, the temperature, the volume of gas taken, etc., are all factors.

If no outlet is allowed and the temperature is kept constant at the time of explosion, the pressure will be constant. Any change in temperature will change the pressure.

Stranded vs. One-Piece Wire

Aurora, Ill.—Editor Motor Age—The resistance of wires is inversely proportional to the area of their cross section, hence the larger the wire, the less the resistance. However, a practical electrician tells me that in order to increase the carrying capacity, ignition wires are made of several small strands of wire instead of one large one.—R. W. Lilley.

The stranded wire is used not because of its greater carrying capacity, but because of its greater flexibility and safety. A stranded wire is not so liable to cause an open circuit as a one-piece wire.

Will Install Charging Outfit

Salina, Kan.—Editor Motor Age—I am figuring on installing a motor-generator battery charging outfit. What would be best equipment to charge twenty 6-volt batteries at once?

2—Would not 125 volts be very advantageous so as to use lamp banks, or would a voltage less than that be better with suitable reostats?—John C. Pyle.

1—Any of the standard motor-generator sets will be satisfactory.

2—The voltage of your line will to a large extent be determined by the number of batteries you will charge at once, the battery voltage and the charging rate. The voltage you mentioned is about correct for twenty 6-volt batteries.

Cost of Racing Cars

Holstein, Ia.—Editor Motor Age—What is the price of a racing car?

2—Do the racers buy their cars or are they given them by the factory?—Donald Harrington.

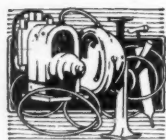
1—Racing cars now in use cost anywhere from \$400 to \$20,000.

2—Some drivers own the cars they pilot, others drive cars belonging to private individuals and others cars belonging to motor car concerns.

Jay-Eye-See Is a Fiat

Cleveland, O.—Editor Motor Age—Will you kindly tell me who owns the Jay-Eye-See racing car and whom it was made by?—A Subscriber.

The Jay-Eye-See now is in the hands of Louis Disbrow. This car is a rebuilt Fiat.



The Accessory Corner

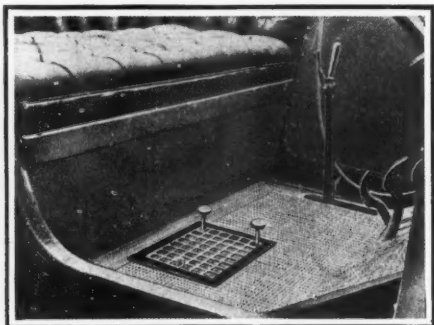


FIG. 1—HEATER FOR FORDS

This is a combination accessory which may be used as a heater, cutout or ventilator. The illustration shows the cutout pedal and heater control also the register for ventilation

Rumpel Lunch Bag

A SPECIAL paper bag in which articles packed in ice may safely be carried in the car, is announced by the Beamish Glass Co., Kansas City, Mo. This bag, shown in Fig. 5, is said to be air tight and waterproof when properly sealed and foodstuffs within will remain cold or hot at least for 12 hours. The top of the bag is made of strong paper-bag stock and the bottom of tag stock and these are heavily coated with paraffine to render them waterproof.

Barnsley Wrench

An easily-adjusted, self-locking wrench, which is free from ratchets or screws and has no jaw teeth, is being marketed by the Automatic Wrench Mfg. Co., Boston, Mass., under the name of the Barnsley wrench.

This tool, illustrated in Fig. 6, depends for its action on a special clutch which causes the jaws to grip more firmly as the effort behind the handle is increased. One hand only is needed to use this wrench and in operation the object is placed between the jaws by properly locating the movable one, and the clutch causes the object to be held tightly, as soon as pressure is exerted on the wrench handle. The jaws may be made to lose their hold by pressing the clutch backward. Nuts up to 1 1/4 inch may be handled. Price is \$1.50.

Spindle Joint Anti-Rattler

A device for preventing rattle of the spindle joint of the Ford and Overland is manufactured by the King Specialty Co., Brookline, Mass. This attachment sells for \$1 for the Ford and \$1.50 for the Overland type.

Benn Tire Pump

A single-cylinder, all-metal engine-driven tire pump, which has a capacity of 150 pounds, is being marketed by the Benn Pump Works, Boston, Mass. The Benn uses ball valves for inlet and exhaust, as shown in the illustration in Fig. 7, and has a ringless piston. While oiling is

done by splash, lubricant is prevented from reaching the air chamber by a separator, in the form of a wick housed in the side of the cylinder. The crankshaft has but one bearing, as the illustration shows. The single rod is made of bronze and the other parts of cast-iron, malleable iron or are drop-forgings.

The pump is 6 inches high, 4 1/2 wide and weighs 3 pounds. Price for Overland, Hudson, Buick and similar cars is \$8 and a Ford model is listed at \$7. The construction of the latter is the same as the \$8 pump, only the capacity is smaller, being 60 pounds.

New J. M. Shock Absorber

The J. M. Shock Absorber Co., Inc., Philadelphia, Pa., is offering a new model, twin-cylinder shock absorber, embodying the general principles of its former design,



FIG. 2—BELFAST BUCKET SEAT

An attractive seat for those who wish to make their cars appear like speedsters. The upholstery is imitation leather and the back is metal

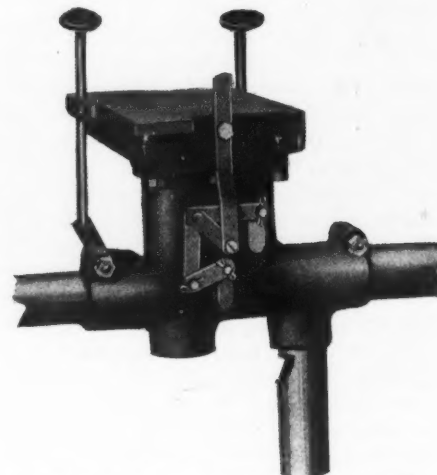


FIG. 4—COMBINATION ACCESSORY

This is another view of the heater-cutout-ventilator shown in Fig. 1. The unit is clamped to the exhaust pipe

but using certain improvements which add to the life of the attachment. This new design is called the type Z2 and it uses a bearing made of Non-Gran bronze, as shown in Fig. 3. This bearing can be replaced easily and at slight cost and should it wear out within 2 years after purchase the maker states replacement will be made free. This applies to all parts of the device.

The J. M. absorber shown is a spiral spring type, designed for cars of less than 3,000 pounds weight, and sells for \$30 per pair.

Heater-Horn-Cutout

A most unique combination accessory for Ford cars is the heater, horn and cut-

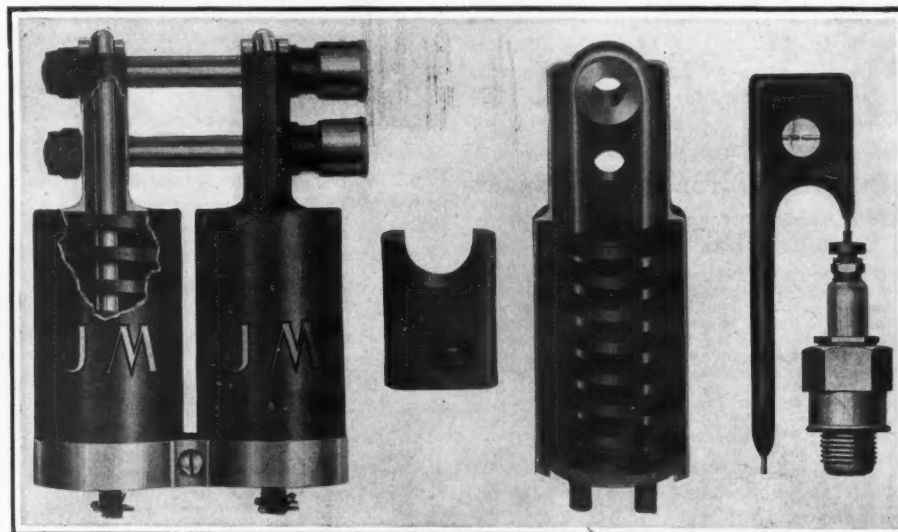


FIG. 3—NEW SHOCK ABSORBER AND SPARK PLUG TESTER

The two views at the left are of a new type J. M. shock absorber which employs a bushing of Non-Gran bronze. This bushing may be replaced easily when worn. The right illustration is of the Royal plug tester, which, by means of an auxiliary gap, indicates whether or not a spark is jumping the regular gap in the plug



FIG. 5—TWO DESIRABLE TOURING ACCESSORIES

At the left is the Rumpel lunch bag, which is made of heavy bag paper and in which ice may be carried, making the bag a small ice-box. The right illustration is a combination water pail and funnel. It is made of heavy duck

out made by Edward McClintock, 221 South 5th street, Minneapolis, Minn. This attachment is clamped to the exhaust pipe, as shown in Fig. 4. The heater control is in the form of a foot-operated valve, which allows hot air to pass through a register, which is shown in Fig. 1. Another pedal controls the cutout in the usual way. For ventilating purposes, the heater is removed and the register used to allow air to rush into the forward or rear compartment.

It is stated that installation may be made in a few minutes and that no rattling of the parts will result. Price is \$5 for the Ford type and types for other cars are made at additional cost to that for the Ford type.

C. B. Grease Cup

A new form of grease cup, whose parts cannot be separated by vibration, it is claimed, and which has a number of other features, is the C. B., made by W. J. Bailey, 401 Mulberry street, Newark, N. J. This cup has a double cylinder and within the inner one is a plunger, which is prevented from turning by two balls, between which is a spring. The illustration in Fig. 6 shows the construction. The

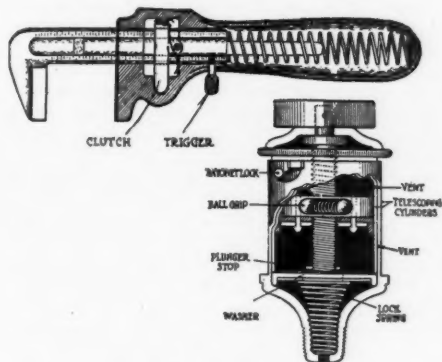


FIG. 6—A NEW TYPE OF WRENCH

The Barnsley wrench shown at the top uses no jaw teeth and is self-adjusting. The clutch shown holds the movable jaw in any position desired. The lower illustration is of the C. B. grease cup, which uses a bayonet joint for cap attachment

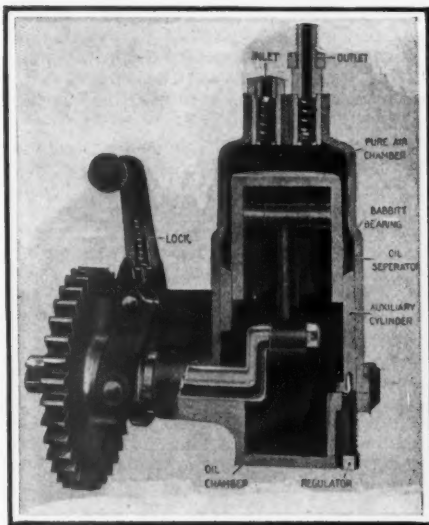


FIG. 7—BENN TIRE PUMP

A single-cylinder motor-driven design using ball valves for inlet and exhaust and having a capacity of 150 pounds. The piston is a ringless design and is wick oiled

cap is held in position by a bayonet lock. The cup is made in brass and nickel finish and in four diameters, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$ and 1 inch. Standard thread sizes are furnished, special threads to order at additional cost. Prices range from 30 cents for the $\frac{5}{8}$ inch and 45 cents for the 1 inch. In nickel finish the price is 5 cents additional to that for the brass finish.

Royal Plug Tester

The Royal Tester Co., 122 Anderson street, Pittsburgh, Pa., has brought out a simple spark plug attachment which tells at all times whether or not the plug is sparking. The Royal is in the form of an inclosed gap, over which part of the ignition current jumps. The gap is formed by brass wire inclosed in a vulcanized rubber housing, as shown in Fig. 3, at the extreme right. There is a small mica window through which the gap may be seen. Price is \$1.

Belfast Bucket Seat

Those car owners who are anxious to

convert their cars to speedsters will be interested in the bucket seats manufactured by the Belfast Mfg. Co., 5th avenue and Main street, Cincinnati, O. This seat, shown in Fig. 2, has attractive lines and is made of 22-gauge steel ironed to a wood-frame bottom. Red or black imitation leather is used for upholstery. The cushion is removable. Price is \$8 each, or \$15 per pair.

Faultless Folding Pail

The National Mfg. Co., Des Moines, Ia., is marketing a touring accessory in the form of a combination funnel and pail, which is made of heavy waterproof duck and sells for \$1. This fitment, called the Faultless, is shown in Fig. 5, at the right, and a feature is that it may be folded so as to take up little room. When used as a funnel a stopper on the inside is controlled by a string fastened to the handle of the bucket.

Spoon-Point Spark Plug

A new spark plug, with a spoon-shaped electrode, is announced by the Spoon-Point Spark Plug Co., La Porte, Ind. The terminals are spoon-shaped, as may be seen in the illustration in Fig. 8, the spoon being 3 millimeters in diameter, the convex surface about $1\frac{1}{2}$ millimeters above center, and the concave surface about 1 millimeter deep, giving an unusually large sparking and wearing surface. The inside convexity of the terminals is claimed to prevent the accumulation of oil and carbon between the terminals and produces a flat, circular spark, while the concave construction affords a drain for oil.

A feature of this plug, in addition to the distinctive shape of the terminals, is the white alloy metal used for the points. This alloy is somewhat lighter in color than platinum, and is claimed to be very durable and especially suitable for spark plug work, remaining bright under intense heat, regardless of the amount of oil used in lubricating the motor. Price of the plug is \$1.

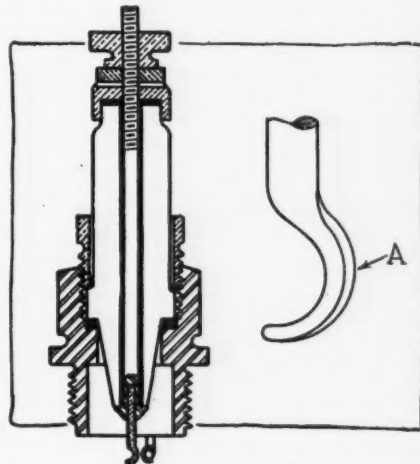


FIG. 8—SPOON-POINT PLUG

A new type of spark plug, a spoon-shaped center electrode, shown at A. The metal used is said to be of special composition and the shape is designed to keep the points free from oil



From the Four Winds



REPORT Shows Movement of Motors—The traffic division of the Minneapolis Civic and Commerce Association in its report for May traffic by freight in and out of the city gives the following figures for motor cars: Freight car lots received, 485; shipped out, 576.

Truck Line for Farmers—A group of farmers near McEwan, Tenn., has arranged to conduct a motor truck transportation line between their farms and Nashville by motor truck instead of by horses, thus enabling them to market the fruit they raise, three times a week instead of about once a week. Last season the inability to get the fruit to market when it was ripe lost them, it is estimated, \$1,700.

Ontario Motors Show Well—Motor licenses taken out in Ontario, Can., for the first 5 months of the year are encouraging. At the close of last year the total number of licenses issued was 31,700, of which 25,300 were for cars owned in Ontario, and 6,400 for outside cars. Up to the present 28,000 odd licenses have been taken out by Ontario owners, and 3,000 by outsiders. An increase of 3,000 cars in the province, with additions for seven months to come, is enough to convince the pessimistic that there is still a measure of prosperity in Ontario.

Tourists Tell of Trips—F. J. Stainbrook, a veteran of the Civil War, accompanied by his wife, have left Los Angeles for New York in their Maxwell 25 which they drove through from Kansas City to Los Angeles two months ago. Mr. Stainbrook learned to drive the car and started for California in it with his wife just 3 days after it was delivered to him. They drove the Midland trail through Denver, Glenwood Springs and Salt Lake City. They are making the ocean-to-ocean trip over the Southern route and write from Dome, Ariz., that there is fearful sand between Holtville and Yuma and poor road to Dome.

Chalkline for St. Louis Pedestrians—The pedestrian in St. Louis nowadays must walk the chalkline, literally. The director of streets upon his return from a recent meeting of the traffic committee of the American Safety First Federation, decreed that there shall be no more crossing of crowded streets cat-a-corner, no more helter-skelter scurrying between motor cars, street cars and wagons, no more avoidable accidents. So heavy white lines now are being painted from corner to corner on the building line and sidewalk line; in this path, and this alone, may the pedestrian henceforth cross downtown streets. The traffic policemen have been asked to enforce this rule as rigidly as other traffic ordinances.

When Is a Jitney Not a Jitney?—Commissioners of the city of Springfield, Ill., are at loggerheads regarding an ordinance to control the jitney buses. One or two favor a measure which is drastic in its provision and virtually drives the buses out of business. The ordinance submitted bars the jitneys from streets now occupied by trolley cars and also places them under the control of the state board of public utilities. An annual license fee of \$50 and a bond of \$10,000 to secure the safety of passengers are features of the measure. Owners of the jitneys have decided that the name is a misnomer and they have substituted motor service cars. In order to avoid any interference by the state board, they will adopt a sliding scale for fare, being based upon the distance to be traveled. By charging from 5 to 25 cents, the bus men say

that they will evade all the proposed harrassing restrictions suggested by the street railway line and simply pay the customary license of the taxicab.

Court Ruling Kills Fire Apparatus Sale—The South St. Paul city council cannot make a contract with the Kisselkar company for a motor-driven fire truck, according to Judge Albert Johnson, of Dakota county, Minn. The council discharged the fire and police commissioners and in March, 1914, voted to buy certain fire apparatus, a duty devolving on the commissioners, according to the court.

Children's Outing a Success—The annual outing of the orphan children of Greater Boston was held last week when a total of about 1,600 children and attendants were taken on a trip to Nantasket Beach through the generosity of the Boston Automobile Dealers' Association and a number of owners who loaned their cars. Secretary Crestor I. Campbell had charge of it and the affair was the most successful of its kind ever held in Boston.

Jitney Men Protest Ordinance—As soon as the decision of the Illinois public utilities commission concerning the operation of jitney buses was learned in Quincy, the city council drafted an ordinance governing the operation of the motor vehicles which practically puts them out of business. The jitneys cannot operate without a franchise, which may be granted following an application, showing the route to be traveled, the schedule of operation and other details. A bond of \$10,000 must be filed to indemnify passengers in case of injury. A license fee ranging from \$75 to \$125, in proportion to the size of the car operated, must be paid. A long list of rules and regulations, governing the operation of the

cars, is incorporated into the ordinance. Owners of the jitneys are planning to fight the measure when it comes up for passage, but have little hope of securing its defeat.

Exports to Latin America—A steamer left the port of New York June 10, carrying \$20,000 worth of motor cars for Buenos Aires. May exports of motor cars to Venezuela amounted to \$10,000.

Boston Motor Truck Show—Boston still clings to the motor truck exposition, the Boston Automobile Dealers' Association at its annual meeting recently held, having decided to hold a joint show, as was held last March, on March 4-11, 1916, in the Mechanics' building.

Bangor Association Election—At the annual meeting of the Bangor, Me., Automobile Association the following officers were elected: Dr. E. P. Sanger, president; Hon. Taber D. Bailey and Dr. F. E. Maxfield, vice-presidents; W. A. Hennessey, secretary; Lawrence Rooney, B. M. Kirstein, E. S. Carter and Harry A. Chapman, board of directors.

Mutual Motor Car Insurance—The Logan County Mutual Automobile Owners' Insurance, with a capital stock of \$51,000, and a membership of seventy-eight owners, was organized at Lincoln, Ill., recently, J. Q. Adams, of Atlanta, being chosen president. Similar companies are being organized all over Illinois. It is claimed that insurance can be provided at a much lower rate than by the old line companies. Assessments are made whenever a claim is filed. Any owner of a car is eligible to join.

Guaranteed Maintenance Expensive—The supreme court of Indiana has just handed down a decision of great interest in connection with guaranteed maintenance schemes. The Indianapolis Motor Car Co. some time ago secured the agency for Hart-Kraft motor trucks. Under the terms of the contract the agent was required to live up to the maker's maintenance guarantee, making repairs and replacements over and above a certain stipulated amount during the life of the guarantee. The vehicles proved to be constructed on wrong principles and the repairs amounted to more than permitted the dealer to make money. He accordingly sued the Hart-Kraft Motor Co. and was awarded \$6,500 damages.

Savings for Motor Car Lost—After scrimping for 7 years, putting away a dollar at a time, until \$400 had been accumulated, the object of the hoard being to accumulate enough to purchase a motor car, Mr. and Mrs. H. A. Fletcher, of Elgin, Ill., lost it within a few hours after closing a deal to buy the car. Afraid to trust banks, the money was hidden in a mattress. During the absence of the couple while selecting the car, the mattress caught fire and was consumed. The police think that thieves learned of the hoard and, after securing it, set fire to the mattress to cover their trail. Not a trace of the money, which was in \$10 and \$20 bills, could be found.

Fair Sex Future Motor Mechanics—The faculty of St. Mary's college, at the suggestion of Miss Mary M. Callahan, director of the physical training department, has adopted a course of motor car mechanics in its curriculum, which is becoming very popular with the young woman students. While it is not considered necessary for a motor car owner to be familiar with all the technical details of motor car construction, nevertheless this knowledge adds to the satisfaction of owning and greatly increases the pleasure of driving, besides insuring better care of

Coming Motor Events

CONTESTS

- *June 24—Hill climb, Unfoltown, Pa.
- *July 3—300-mile race, Sioux City, Ia.
- *July 3—Hill climb, Oriskany Falls, N. Y.
- *July 4—Road race, Chico, Cal.
- *July 4-5—Speedway races, Tacoma, Wash.
- *July 5—Road race, Visalia, Cal.
- *July 5—Track meet, Chester, Pa.
- *July 5—Speedway races, Omaha, Neb.
- *July 5—Track meet, Lewistown, Me.
- *July 7-8—Track meet, Taylor, Tex.
- *July 9—100-mile dirt track race, Burlington, Ia.
- *July 31—Speed races, Des Moines, Ia.
- *July 31—Road race, Denver, Colo.
- *July—Track meet, Allentown, Pa.
- *August 13—Track meet, Flemington, N. J.
- *August 14—Dirt track races, Janesville, Wis.
- *August 20-21—Elgin road races, Elgin, Ill.
- *August 28—100-mile dirt track race, Kalamazoo, Mich.
- *September 6—Speedway races, Providence, R. I.
- *September 11—Speedway races, Minneapolis, Minn.
- *September 24-25—Track meet, Grand Rapids, Mich.
- *October 2—Speedway races, New York.
- *October 1-2—Track meet, Trenton, N. J.

*Sanctioned by A. A. A.

SHOWS AND CONVENTIONS

- September 13-19—Pan-American road congress, Oakland, Cal.
- January 1-5—New York show.
- January 22-25—Chicago show.
- March 4-11—Boston show.

the car. St. Mary's college probably is a pioneer in the matter, compared with the institutions devoted to the education of young women. The chassis of a Studebaker car is used in the instruction.

Trolley Companies Can't Run Jitneys—Gov. Brumbaugh, of Virginia, has vetoed the bill to allow street railway companies to operate motor buses or to conduct jitney services in connection with their systems on the ground that such powers would stifle competition. The governor recently signed the bill to enable cities to regulate jitneys.

Motor Accessory Body Elects—The Motor Accessories Trade Association of St. Louis, Mo., has elected officers for the ensuing year as follows: President, Allan H. Clark; vice-president, W. E. Finney; treasurer, A. C. Bauer; directors, L. E. Allmon, W. K. Norris, H. Lee Smith, A. R. Baxter, J. P. Patterson. The legislative committee reported they had been informed by the director of streets that the practice of putting stationary motor cars on the street with signs bearing their price would have to be stopped, as this virtually converted the street into an auxiliary salesroom.

Rose Carnival Prize Awards—As usual, a feature of the annual rose carnival in Portland, Ore., was the decorated motor parade. Many and original were the entries in all classes and the judges had a hard time to pick the winners from among the many hundreds of cars decorated with roses, wild flowers and ferns. The Washington high school with its magnificent maroon and gold float, took the grand prize over all entries. The design of the float, a fountain of flowers, was worked out to a nicety by the students, who were

awarded the \$250 prize. First prize for the best decorated electric or runabout went to Mrs. W. O. Schuyver. Mrs. Helen Ladd Corbett was winner again this year of the \$150 prize.

73,300 Motor Cars in Minnesota—There are 73,300 motor cars, and about 10,000 motorcycles in Minnesota, according to license records. Last month 7,995 licenses were issued.

To Organize Wyoming Automobile Association—A call has been issued for a convention of Wyoming motorists and good roads enthusiasts to meet in Cody, Wyo., July 29, at the Cody Club, for the purpose of organizing the Wyoming State Automobile Association to bring together the men of the state into a practical working organization for the purpose of boosting all state highways and transcontinental roads that bring travelers into Wyoming, for procuring state and federal aid in road building and for the securing of further beneficial legislation.

Washington Motor Law Increases Revenue—The new motor law in the state of Washington which went into effect on June 10 will bring at least \$37,500 into the state coffers, which was not paid in last year, to say nothing of the large proportion which, operating in the jitney or for rent trade, must pay 50 cents per horsepower. As an illustration, the Ford machine, with an insurable 23 horsepower, will cost the owner \$11.50 if used for passenger-carrying, as against \$2.50 at present. Of the 15,000 machines in the state which are being operated illegally, fully 6,000 are in the Seattle district, but with the new law in effect revenue will be derived from cars which have been running without license of any kind.

Recent Incorporations

Albany, N. Y.—Baltimore Garage, to deal in motor cars, vehicles, etc.; capital stock, \$10,000; incorporators, M. J. Hanlon, Charles J. Steierman, Eldred D. Nielsen.

Albany, N. Y.—Berger-Madden Garage, to deal in motors, etc.; capital stock, \$20,000; incorporators, K. C. McDonald, W. J. Madden, O. J. Berger.

Albany, N. Y.—Interstate Motor Corp., motor cars, garages, motor service, etc.; capital stock, \$5,000; incorporators, K. B. Sackmann, J. A. Bloom, J. A. Wilkens.

Albany, N. Y.—Solo Tire Co., to deal in tires, car cases, steel plates, etc.; capital stock, \$100,000; incorporators, Evelyn F. Price, Lavini Leitch, John W. Suling.

Albany, N. Y.—Supreme Tire & Rubber Co.; capital stock, \$10,000; incorporators, R. S. Sneyly, H. T. Mahan, Baldwin C. Young.

Arcadia, O.—Access Auto Co., to operate a sales agency and garage; capital stock, \$25,000; incorporators, C. R. Simkins, E. R. Struble, F. P. Conaway, C. Wheland and R. C. Willis.

Baltimore, Md.—Standard Garage Co.; capital stock, \$10,000; incorporators, Harry Hoffberger, Harry Goldberg and Richard H. Biggs.

Boston, Mass.—American Auto Signal Co.; capital stock, \$50,000; incorporators, William F. Conklin, Martin L. Welsh and E. T. Treen.

Boston, Mass.—Noyes-Bulck Co., wholesale distributors of the Buick car; capital stock, \$250,000.

Boston, Mass.—Oldsmobile Co. of New England, to manufacture motor vehicles; capital stock, \$100,000.

Boston, Mass.—Sovereign Motor Truck & Service Co.; capital stock, \$50,000; incorporators, James Henry, Mat J. F. Ashworth and C. F. Keating.

Brockton, Mass.—Reinforced Inner-tube Co., to manufacture inner tubes; capital stock, \$300,000; incorporators, Frank L. Price, Frank H. Briggs, Harold Bent.

New York—McGee Garage Co.; capital stock, \$10,000; incorporators, Walter C. McGee, Martin O. O'Halloran, and Thomas J. Ryan.

Brooklyn, N. Y.—Berger-Madden Garage, garage business; capital stock, \$20,000; incorporators, Otto R. Berger, William J. Madden and Kinzie C. McDonald.

Brooklyn, N. Y.—B. M. C. Company, motor car business, etc.; capital stock, \$1,000; incorporators, Harry Onwin, Clifford M. Bishop, Warren A. Sellen.

Brooklyn, N. Y.—Machine Appliance Corp., to manufacture engines, motors, trucks, etc.; capital stock, \$2,000; incorporators, Almon C. Kellogg, Carl E. Buckley, William E. Taft.

Brooklyn, N. Y.—Miller Centrifugal Motor Co., to manufacture motor cars; capital stock, \$800,000; incorporators, Martin Lippman, Emanuel L. Meyer, Emma Ullmann.

Buffalo, N. Y.—Quale Garage Co.; capital stock, \$20,000; incorporators, Ralph J. Quale, Grant W. Quale, James H. Quale, Robert B. Martin, Emma Martin, Eleanor H. Martin, Robert E. Martin.

Buffalo, N. Y.—Schoepflin-Baxter Co., motor cars, accessories, etc.; capital stock, \$5,000; incorporators, L. G. Schoepflin, H. C. Schoepflin, A. F. Baxter.

Cleveland, O.—Auto Rescue Service Co., to operate a garage and repair shop; capital stock, \$5,000; incorporators, J. Morgan, A. Cooper, Paul W. Hill, Hugo Karman and N. W. Edwards.

Cleveland, O.—Globe Accessories Co., to deal in all kinds of accessories; capital stock, \$10,000; incorporators, J. M. Engle, F. C. Brew, Raymond Hendrickson, Charles F. Saenger and Virgil B. Eagle.

Cleveland, O.—Ohio Gear Grinding Co., to operate a machine shop; capital stock, \$10,000; incorporators, Mayhew M. Noyes, Francis J. Wing, Leo Ulmer, Max Efres and Irene Bolard.

Cleveland, O.—Sixth City Auto Sales Co., to deal in motor cars and accessories; capital stock, \$3,000; incorporators, Fred Desberg, F. A. Cook, E. F. Strong, S. I. Powerli and W. T. Resmond.

Covington, O.—Covington & Bradford Jitney Co., to operate a jitney service; capital stock, \$5,000; incorporators, R. F. Albery, Henry Ehlen, W. Oscar Beggs, Frank Marry and G. O'Donnell.

Detroit, Mich.—Century Mfg. Co., to manufacture vehicles and machinery; incorporators, Edwin Denby, Philip Braumeyer, John Gillispie, and William P. Pagel.

Detroit, Mich.—Detroit Auto Accessory Co.; capital stock, \$2,000; incorporators, J. C. Beck, T. A. Ballinger and Oscar C. Hull.

Detroit, Mich.—Detroit Motor Appliance Co.; capital stock, \$45,000; incorporators, William E. Carpenter, Howard R. Crawford and Herbert R. Lewis.

Detroit, Mich.—Detroit Tiger Motor Car Co.; capital stock, \$15,000; incorporators, William F. Carpenter, Ernest A. Kelly and James B. O'Neill.

Detroit, Mich.—Gaslock Sales Co.; capital stock, \$5,000; incorporators, Charles R. Chisholm, Robert G. Clark, Roy B. Johnston.

Elyria, O.—Colliseum Garage Co., to operate a garage and repair shop; capital stock, \$5,000; incorporators, Otto Nemeyer, C. F. Newman, T. P. Robson, J. E. Robson and I. M. Austin.

Farmingdale, N. Y.—Farmingdale Auto Garage Co.; capital stock, \$3,000; incorporators, Arne Meyer, Ernest Agren and George A. Conroy.

Gratiot, Mich.—Associated Losier Purchasers; capital stock, \$24,000; to deal in motor cars, supplies, accessories, etc.; incorporators, Charles Shongood.

With the Motor Clubs

Open New Club House—The club house of the Grand Rapids Automobile Association was opened June 12. It is located in Plainfield, north of Grand Rapids, Mich., and overlooks Grand river. Its location, it is claimed, makes it one of the most attractive and picturesque motor clubs in the country. The association now has over 400 members and is becoming every day stronger and of greater assistance and benefit to motorists. One of its many committees is the vigilance committee, consisting of twenty prominent citizens, who have the title of deputy sheriffs and special traffic police officers. As the title indicates, they look after matters concerning traffic, and may act just as if they were regular members of the police force.

Hub Electric Bodies Merge—The Boston Motor Car Club has been merged with the New England section of the Electric Vehicle Association, it having been decided that as both clubs were in harmony and were conducting work along similar lines, they might better combine.

Clubmen Champion Road Improvement—Secretary Fred H. Caley, of the Cleveland Automobile Club, headed a delegation of county and city officials from Cleveland to appear before the Ohio highway commission for the improvement of 7 miles of highway in Cuyahoga county. He called attention to the fact that Cleveland and Cuyahoga county, at a cost of \$10,000,000, have paved with brick 486 miles of roadway in the county and that the 7 miles asked for is the only remaining section in the county not improved. That has been done without asking for state aid, although in the meantime Cleveland has paid into the road fund over \$800,000.

Hudson Falls, N. Y.—Community Auto Co., motor car business; capital stock, \$10,000; incorporators, Francis H. Facker, Frank E. Jones and John B. Davis.

Harrisburg, Pa.—Beech Creek Truck & Auto Co., to manufacture motor cars; capital stock, \$100,000.

Huntington, N. Y.—Cargan-Orcutt Sales Co., motor car business; capital stock, \$5,000; incorporators, John A. Carlson, Hudson E. Orcutt and Joseph H. Velser.

Huntington, N. Y.—Supreme Tire & Rubber Co., general tire and rubber goods, motor car equipment, etc.; capital stock, \$10,000; incorporators, Herbert T. Mahan, Baldwin C. Young, Robert S. Sneyly.

Indianapolis, Ind.—Coons-Vayo Co.; capital stock, \$25,000; to deal in motor accessories; incorporators, Sanford F. Coons, Alfred H. Vayo, Edward J. Holliday, Webster A. Parr and Gilbert H. Hendren, Jr.

Irrington, N. J.—Essex Tire Reconstruction Co., to manufacture motor car tires; capital stock, \$125,000; incorporators, William Barth, Frank H. Butterworth, Fred M. Marvin.

Kansas City, Mo.—Gate City Motor Co.; capital stock, \$10,000; incorporators, H. P. Sutton, J. Castor and W. C. Riggs.

Lake Placid, N. Y.—McElroy-Prime Motor Co., motor car business; capital stock, \$50,000; incorporators, John H. McElroy, Spencer, G. Prime, Patrick J. Hennessey.

Lancaster, O.—Ohio-West Virginia Motor Club Co., to operate a club for motorists at Buckeye Lake; capital stock, \$20,000; incorporators, Benjamin F. Gayman, O. M. Trimmer, Palmer Howard and L. C. Silbach.

Long Island City, N. Y.—Comet Storage Battery Co., to manufacture electrical apparatus, storage batteries, etc.; capital stock, \$10,000; incorporators, Gustav Kiel, Hugo Kiel, Jay A. Hurst.

Louisville, Ky.—Carlisle Garage; capital stock, \$3,000; incorporators, Robert Harper, Mrs. Ruth Harper, William Harper and C. W. Collier.

New York—Cleveland Sales Co., general trade in motors; capital stock, \$10,000; incorporators, Joseph G. Laino, Norman N. Rollison and M. Anton.

New York—Eastern Motor Sales Corp.; capital stock, \$10,000; incorporators, Frank S. Hannah, Albert G. Keinath, Charles M. Fleming.

New York—Traveller Tire & Tube Co.; capital stock, \$50,000; incorporators, Samuel Mark, Louis M. Barman, Louis Lyster.

Newark, N. Y.—Newark Public Line, to manufacture, buy and sell motor cars; capital stock, \$50,000; incorporators, James Brosniak, Louis Pennitch, Sarah Talkowsky.

New York—Automobile Owners Purchasing Corp., motor car business; capital stock, \$10,000; incorporators, Francis B. Wood, Joseph R. Clevenger and Christian S. Lorentzen.

New York—Biltmore Garage, motor car garage; capital stock, \$10,000; incorporators, Elfred E. Jacobsen, Charles J. Stierman and M. J. Hanlon.

Trenton, N. J.—Essex Tire Reconstruction Co., to manufacture motor car tires, etc.; capital stock, \$125,000.



Among the Makers and Dealers



MOTOR Company Changes Hands—The business of the Green Motor Car Co., Tacoma, Wash., distributor of King motor cars, has been purchased by R. C. Field.

Talk of Lenox Moving—There is a rumor that the Lenox Motor Car Co., of Hyde Park, Mass., may move to Lowell, Mass., in the near future if sufficient inducement is held out by the latter city.

Big Carbon Remover Production—The Burnox Co., of West Allis, Wis., organized last fall, has reached a large production of a preparation for removing carbon from gas engine cylinders. Orders are being received from all parts of the country. The company is headed by Theodore Mueller, and C. E. Kubicek is secretary and treasurer.

Fisher Body Buys Universal Plant—The Fisher Body Co., Detroit, Mich., has purchased the four-story plant of the Universal Motor Truck Co., also 3 acres of ground of the truck company. The deal involves \$120,000 it is claimed. This is the second big purchase made by the Fisher Body Co. within a few weeks, the first being that of the bankrupt Detroit Body Co., and which was for a consideration of \$170,000.

King Eights by Trainload—The Chicago King Motor Co. orders King eights by solid trainloads. So far this year it has sold 75 carloads of these cars and the demand is still far from being supplied. April 15 it received a shipment of a full trainload of King eights. It was said to be the world's largest single order for eight-cylinder cars. It was the first solid trainload of motor cars of any make shipped to Chicago this year.

Management of Missouri Velle Changes—The management of the Velle Motor Co. of Missouri has been taken by Alex Steiner, who succeeds Ashley Gray. Mr. Steiner is an electrical and mechanical engineer and a St. Louisan. He formerly was connected with the Metropolitan Elevated Railway in Chicago, and with the American Brake Co. He announces that the service department of the Velle Co. will be greatly improved.

Goodyear Plant Expansion—Five acres of additional floor space will be available at the factory of the Goodyear Tire and Rubber Co., Akron, O., when the new addition to the plant is completed. It is planned to have the new buildings ready, with machinery installed, at the beginning of the company's fiscal year, November 1. The present tire production of the company is 12,000 a day. The new buildings will make possible a production of 15,000 a day.

Oldsmobile Business Reaches Highest Point—Since the announcement of its 1916 line, entailing a drop of \$190 in the price of its four-cylinder model, the Olds Company of Lansing, Mich., has sold and shipped cars faster than at any previous time in the history of the concern. General Sales Manager J. V. Hall says the curved-dash runabout days 15 years ago did not equal the present time so far as the production and delivery of cars is concerned.

Chandler Breaks Sales Production Records—Gains of a phenomenal nature in both sales and production of Chandler sixes are shown by a recent report of the sales department of the Chandler Motor Car Co., Cleveland, O., covering the last few months' transactions. In an effort to keep pace with record-breaking sales of the new seven-passenger Chandler six, production officials at the big Cleveland plant have performed almost superhuman tasks in the way of acceler-

ating shipments. That results have been secured is shown by the fact that May shipments showed an increase of 493 per cent over the same month last year.

Tire Company in Connecticut—The Monarch Stitched Tire Co., formed recently in Maine, has just purchased the Munroe-Eastman Co.'s plant at the border line between Newington and New Britain, Conn., in which the company will manufacture its product. The tire is both stitched and cemented into the tread and a guarantee of 6,000 miles without the adjustment clause will be given by the makers.

McClurg Rubber Soon to Operate—The McClurg Rubber Co., Coshocton, O., recently organized to manufacture tires, has elected as directors, J. S. McClurg, C. M. Christenson, H. T. Forrest, J. L. McClurg and W. Z. Davis. The directors elected the following officers: President and general manager, J. S. McClurg; vice-president, C. M. Christenson; secretary and treasurer, H. T. Forrest. The company expects to be operating by July 1.

Specialty Concern Doubles Factory Space—The Metal Specialties Mfg. Co., Chicago, has recently doubled its factory and office space and equipment in order to accommodate the large increase in its business since January 1. The company manufactures the Presto specialties, which include Presto electric cigar lighters, dash lamps, inspection and trouble lamps, combination dash and trouble lamps, battery hand lamps and Anchor Ediswan type connectors, all for the motor car supply and motor boat trade.

Canadian Ford Plant Enlarged—The Ford plant at Ford City, Ont., rapidly is becoming one of the biggest manufacturing plants in Canada. A six-story addition, 700 feet long and 45 feet wide, is to be started within a few days at a cost of over \$85,000. It will be erected on a site located on the river bank, which the company started to have filled in several years ago. The structure will be of concrete, steel and brick, supported by several hundred piles 35 to 40 feet long. With the six-story addition started last year and now almost completed, the Canadian plant will have nearly 150,000 square feet additional floor space.

New Factory for Hartford Companies—Ground was broken last week on the site of a three-story factory building 200 by 55 feet, by the Hartford Motor Car Co. and the Walker & Barkman Mfg. Co., Hartford, Conn. W. C. and C. E. Walker and Ralph M. Barkman make up the personnel of each organization, the Hartford Motor Car Co. having the Dodge agency in this county and the Walker & Barkman Mfg. Co. the parts-making business acquired from Receiver George Pope, of the Pope Mfg. Co. The first floor of the new three-story structure will be utilized by the Hartford company as a service station for Dodge cars and will be connected with the new salesroom, which will be completed the last of this month. The Walker & Barkman Mfg. Co. will utilize the balance of the building in making Pope-Hartford car parts. It is expected that a fair-sized force will be employed by the latter organization, which is now in the west wing of the Pope works pending completion of the new building. Local rumor had it that the building would be used for the manufacture of war material, color having been added to the report because a prominent Roumanian was seen in the pres-

ence of the Walkers. Ralph M. Barkman says that the work will be rushed with all possible speed.

English Motor Works Burned—Fire did a \$500,000 damage to the motor works of Brian, Hughes & Strachan at Park Royal, England, June 10. The buildings covered 3 acres and contained 100 Red Cross motor ambulances and 200 army motor vans. The vehicles, which were ready for delivery to the government, were destroyed.

New Car on Road—The first model of the Sterling car, built by the Sterling Motor Car Co., of Brockton, Mass., is now on the road undergoing tests. The plans have been changed on the price and equipment, and it is now arranged to build a runabout that will retail for about \$800. It is expected that deliveries will be made in September.

Permanent Cole Milwaukee Branch—The Cole Motor Co., Indianapolis, Ind., has leased the new garage now being erected in Milwaukee, Wis., as a permanent home for its Milwaukee branch, which was established 2 years ago, and has had temporary quarters at 188-190 Eighth street ever since. The company will take occupancy of the new quarters about August 1. Fred E. Tabbert is manager of the Milwaukee branch.

Cole Shipping Record Set—Production at the plant of the Cole Motor Car Co., Indianapolis, Ind., has been growing so rapidly within the last few weeks that the shipment of cars is setting new records. Ninety carloads of motor cars were shipped from the local factory the first week in June. It is said that the average shipments for the month will be 100 carloads or more each week.

Moreland Truck Factory—Watt L. Moreland, president and general manager of the Moreland Distillate Motor Truck Co. of Los Angeles, Cal., has announced that the capacity of the local truck factory is to be doubled in the near future. Four times in 4 years the Moreland plant has been enlarged, the capacity being doubled each time. There are \$200,500,000 invested in Moreland trucks now operating in southern California.

Franklin to Retire Preferred Stock—The Franklin Automobile Co., of Syracuse, N. Y., will take advantage of its option and retire all preferred stock on hand July 1, paying therefor \$110 a share and accrued dividends. The stock sold at par in 1913. The first 5 months of 1915 the company's business showed 64 per cent increase over business during the same period last year. This increase represents shipments only, the company not being able to keep production up to demand, actual orders received being 90 per cent in excess of last year during the 5 months' period.

Studebaker Expands in Long Island City—The Studebaker Corp. branch quarters in Long Island City, N. Y., have been found inadequate and as a result a new building will be erected at the Degnon terminal to care for both service and storage. The building will be of concrete, fireproof, 160 by 80 feet, four stories high and will be ready for occupancy November 1. The present home of the company will be rearranged for purely retail purposes. The first floor will be devoted to a showroom. Used cars will be exhibited on the second floor. As at present, the general offices will be on the third floor. The fourth floor will have a complete assortment of stock and parts, supplementing the work to be done at Long Island City. The fifth floor will be a salesroom for the light trucks.



Brief Business Announcements



DETROIT, Mich.—J. R. Emerson has been appointed purchasing agent for the King Motor Car Co.

Boston, Mass.—E. A. Ross, formerly with the Buick company at Springfield, Mass., has moved to Palmer, where he has taken charge of the service department of the Timothy Sullivan Co.

Boston, Mass.—Frederick E. Nichols, formerly with the Chalmers company, and later New England traveling representative of the Hupp Motor Car Co., has joined the Noyes-Buick Co., New England distributor of the Buick.

Hartford, Conn.—The Buick representation which has been vested heretofore in the Hartford Buick Co., which was also associated with the Buick agency in Springfield, Mass., has passed to David B. Roberts, until recently manager of the Hartford Buick Co.

Fresno, Cal.—J. W. Leavitt & Co., Pacific Coast distributors of the Willys-Overland Co., has established a branch here. Calvin C. Elb, executive supervisor of the company, is at present in charge of the new branch and is installing a service system.

Seattle, Wash.—H. H. Hazeltine and Arthur W. Hoppock are joint owners of the Seattle Tire & Rubber Co., just opened here, representing the Falls tires. Mr. Hazeltine for many years was connected with the tire experimental laboratories at Akron, O.

Toledo, O.—George M. Berry, formerly vice-president and treasurer of the Thomas B. Jeffery Co., Kenosha, Wis., and for the last 18 months affiliated with the Willys-Overland Co., here, with his energies directed toward the upbuilding of the advertising department, has been made advertising manager for the latter concern.

Los Angeles, Cal.—M. H. Green, one of the best known salesmen in the motor car industry of southern California, has joined the selling force of Earle C. Anthony, Inc., as outside salesman for the Packard. Heretofore Packards have been sold at retail only in this territory, but Anthony's allotment for the

coming season has been increased and he will appoint sub-dealers in the larger southern California towns.

Tacoma, Wash.—James Tormey, formerly with the San Francisco branch of the Good-year Tire & Rubber Co., is the new manager of the Service Tire & Oil Co., of San Francisco, distributor of Nassau tires.

Boston, Mass.—C. R. Robinson, who resigned from the Alvan T. Fuller Co., last January to go into business for himself, has rejoined the Fuller organization. He stood among the leaders of the United States as a Packard salesman.

Boston, Mass.—Sherwood Hall, Jr., who has the agency for the Paige-Detroit here, has secured more territory from the factory and now he has Cheshire, Rockingham and Hills-boro counties in New Hampshire, which gives him the cities of Keene, Portsmouth and Nashua.

Boston, Mass.—J. H. Lee, who has been connected with the Locomobile, Knox and Stevens-Duryea factories, has gone to Lowell, Mass., to take charge of the service department of the Sawyer Automobile Co.

Los Angeles, Cal.—L. M. Rash has joined the local Chalmers agency which is controlled by Earle C. Anthony, Inc., having resigned from the local Cole sales force to accept the new appointment.

Detroit, Mich.—William M. Jenkins, who has been sales manager of the Master Carburetor Corp., since this concern was started here last year, has returned to the Pacific coast to take charge of the sales of the Master Carburetor Co., Ltd., Los Angeles, Cal.

Jackson, Mich.—C. L. Halladay has resigned as chief engineer and factory manager of the Lewis Spring & Axle Co., this city.

San Francisco, Cal.—Norman De Vaux, for many years past head of the Reo Pacific Co., California distributor of the Reo line, is no longer distributor of the Lansing car here. He has taken over the coast agency of the Chevrolet car. He will change the style of

his firm to the Chevrolet Car of California. De Vaux has taken with him most of his agents that handled the Reo line.

Boston, Mass.—Henry A. Kroh, formerly New England representative of the Continental Asbestos Corp., with headquarters here, has resigned to accept a position with the Brown-Apperson Co., New England distributor for the Apperson line.

Chicago—J. E. Duffield, who, for several years, has been manager of the Chicago branch office of the Thermoid Rubber Co., has resigned and will be succeeded by Joseph H. Liston, formerly of the Detroit office of the company.

Dayton, O.—A fire which destroyed the plant of the C. W. Hoffritz Sales Co., burned thirty-one motor cars. Of the destroyed cars twenty-eight belonged to the Hoffritz company and three to the Baker Taxicab Co. The blaze was caused by a gasoline explosion.

Charlotte, N. C.—C. N. Gillette, formerly employed at the Chase factory but more recently manager of the Chase Motor Trust Sales Co., handling the Chase line in Charlotte, N. C., on June 1 joined General Sales Manager Boulden's staff as division sales manager covering the states of North and South Carolina and Virginia, with headquarters here.

Kenosha, Wis.—George W. Higgins of Wilmot, Wis., has purchased an interest in the garage and agency firm of W. M. Curtiss & Sons, Kenosha, Wis. The company has been handling the Chevrolet for some time and now takes on the Oldsmobile in addition.

Milwaukee, Wis.—The Western Iron Stores Co., Milwaukee, one of the largest wholesale and retail dealers in mechanics' tools, machinists', mill and shop supplies, has moved to new and larger quarters at 145-147 West Water street, one block south of Grand avenue. The company has been located at 137 Second street since its establishment.

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make
Alliance, O.	Conser Bros.	Metz
Alma, Mo.	R. E. Knipmeyer	King
Appleton, Wis.	Main Auto Co.	Case
Baltimore, Md.	Beam Motor Car Co.	
	Chandler	
Berlin, Wis.	E. C. Deibler	King
Baraboo, Wis.	A. S. Lanich	King
Bad Axle, Mich.	Black Brothers	King
Brown City, Mich.	Frank McDougall	King
Burlington, Wis.	Automobile Supply Co.	King
Boston, Mass.	Regal Motor Sales Co.	Regal
Banning, Cal.	J. L. Devine	Maxwell
Cambridge, O.	The Guernsey Garage & Mch. Co.	King
Colby, Wis.	F. Riplinger & Son	King
Croswell, Mich.	F. A. Moore	King
Capac, Mich.	J. Burger	King
Carsonville, Mich.	C. C. McGregor & Son	King
Clinton, Wis.	J. Terwilliger & Son	King
Clifton, Ariz.	Clay & Ruth	Maxwell
Damariscotta, Me.	C. E. & Alvin Piper	Maxwell
Dwight, Kan.	M. C. Strom	King
Darlington, Wis.	H. G. Gallagher	King
Dayton, O.	W. C. Wampler	King
Eau Claire, Wis.	Overland Co.	Overland
Eddyville, Ia.	Eddyville Garage	King
Fair Haven, Mich.	Meyer & Labonty	King
Green Bay, Wis.	Hooker & Kittell	King
Hamilton, Mont.	R. C. Parmontor	King
Honolulu, H. I.	Hamm-Young Co., Ltd.	
		Chevrolet

Town	Agent	Make
Hillsdale, Mich.	A. M. Davis & Son	Overland
Jefferson, Wis.	Jefferson Auto Co.	King
Kensington, O.	Manfull & Sinclair	Metz
Lexington, Mo.	Henry Keller & Sons	King
Montello, Wis.	James O'Donald	King
Milwaukee, Wis.	Wisconsin-Oakland Co.	
		Oakland
Milwaukee, Wis.	Diener-Nelson Auto Co.	
		Haynes
Milwaukee, Wis.	Milwaukee Motor Sales Co.	Oakland
Morgan City, La.	Morgan City Electric Co.	Franklin
Marine City, Mich.	Zimmerman Bros.	King
Minneapolis, Minn.	Frederick E. Automobile Co.	Partin-Palmer
Marlette, Mich.	Marlette Hardware Co.	King
Marquette, Mich.	Asire & Palmer	Overland
Minden City, Minn.	Joseph Shayer	King
Minneapolis, Minn.	I. W. Munzer Sons Co.	King
New Holstein, Wis.	Melli Bloomberg Co.	King
Newark, N. J.	Pierre L. Smith Co.	Marmon
New Glarus, Wis.	Joseph D. Hosely	King
New York, N. Y.	Pullman Sales Co.	Abbott
New York, N. Y.	Pullman Sales Co.	Marion
Oshkosh, Wis.	B. S. Friday Auto Co.	King
Pittsburgh, Pa.	W. W. Bennett Motor Co.	King
Plattsburg, N. Y.	A. H. Marshall Co.	Marmon
Peck, Mich.	Grimes & Waterman	King

COMMERCIAL

Arkansas City, Kan.	U. P. Paris	Koehler
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Jefferson City, Mo.	P. M. Garage	Koehler
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Town	Agent	Make
Portland, Me.	A. E. Darling	Jackson
Reedsburg, Wis.	Duren Bros.	Jeffery
Racine, Wis.	Loches & Smader	King
Rockerville, Mich.	Paige Garage	King
South Milwaukee, Wis.	South Milwaukee Garage	
		Overland
Saginaw, Mich.	C. H. Guider	Briscoe
Sandusky, Mich.	Woodman & Ferguson	King
Seymour, Tex.	Sedler & Wood	King
St. Joseph, Mo.	E. S. Haddleston	King
St. Clair, Mich.	Wood's Service Garage	
		Saxon
San Angelo, Tex.	Bryns Auto Co.	King
Sonora, Tex.	W. L. Aldwell	King
Sawyer, Wis.	John Peltier	King
Schoolhill, Wis.	H. F. Knorr	King
Schuylerville, N. Y.	Ford Garage Co.	Franklin
Toledo, O.	Guy R. Ford	Saxon
Toledo, O.	Cornelius-Browning Co.	
		Chalmers
Topeka, Kan.	J. A. Nicholas	King
Taft, Cal.	Lierly & Son	Maxwell
Unity, Wis.	F. Riplinger & Son	King
Winslow, Ariz.	M. W. Dadey	Maxwell
Washington, D. C.	William P. Barnhart	King
Williamston, Mich.	Stenger & DeYoung	
		Chevrolet
Worcester, Mass.	Worcester Auto Co.	Detroit
Wilson, Kan.	P. C. Kloms	King
Yale, Mich.	Elbor & Berth	King

Worcester, Mass.	Ridstar Motor Co.	Koehler
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The Motor Car Repair Shop



Valuable Tire Pointers

THE matter of proper tire care is perhaps about the most important consideration of the average motorist, for it is more vital to his pocketbook than anything else in connection with his car. Much is written and more is said about how to get the maximum mileage out of tires, but the views of authorities vary so widely, and the published advice varies so widely that the car owner often is at sea as to just what is the best for his tires. In some places he reads that inflation to tire makers' recommended pressure is not advisable; he has it hinted to him that the manufacturers are swayed by commercialism and hence they favor abnormal pressures to further sales of tires through more rapid wearing out.

This actually was told to a motorist by a garageman who had had enough experience to know better. Such a statement is foolish on the face of it. The tire makers want to have their tires last as long as they can, for it means satisfied customers and more business. They, therefore, are the logical and best source from which to gain valuable information on proper care of tires. The first and most important tire rule is to pay strict attention to the recommended inflation pressure for the particular size and make of tire you are using, and maintain that pressure to the best of your ability.

Mileage Contest for Chauffeurs

Recently a large tire maker ran a contest for chauffeurs, giving large prizes for the greatest mileage attained with its tires. The lessons to be learned from this contest ought to be valuable. Some of the winners of the first few prizes were asked how they had attained such high tire mileages, and nearly every one put proper inflation in the first place. They made it a point while the contest was going on at least to test the tire pressure each day before doing any driving.

Several of them put as the second most important point the careful driving so as to save their tires as much as possible. Proper use of the brakes so as to avoid the very detrimental sliding and grinding of the rubber on pavements, avoidance of sharp stones and street car tracks as much as possible and the taking of bumps as slowly as possible all are considerations coming under this head. The winner of the contest, who had well over 12,000 miles usage out of the tire that brought him the money, also was very careful to go over the tires each day and to fill any cuts of any size with a rubber filling compound.

In a contribution to the records of the Society of Automobile Engineers, P. W. Litchfield, factory manager of the Good-year company, and undoubtedly one of the

foremost authorities on tire matters in this country, gives some very valuable advice to the car user as to how best to meet the problems of tire care. He says very positively that under-inflation is the thing to watch out for and guard against—not over-inflation. If it is found necessary for comfort and protection to carry a lower pressure than that recommended, it should be done by all means, he explains, but it should at the same time be plainly understood that one always takes a chance with tires by so doing, and the practice never can be excused by considerations of temperature or any other minor causes tending to increase the pressure. If for any reason the pressure must be lowered, it can be done and durability maintained only by the use of larger tires.

Over and Under-Inflation

In fact, this authority says that it is practically impossible to hurt tires by over-inflation, providing they have not previously been damaged by overloading and under-inflation. They are built with a very high factor of safety, and in tests they have been inflated to as high as 300 pounds per square inch pressure without anything harmful happening to the tire, the rim finally giving way. This at once nails a belief that is quite general that high pressure in a tire renders it a dangerous thing. The bursting pressure is several times the pressure which is recommended.

Of course there are limits to which the inflation should be carried for comfortable riding, and obviously a too highly inflated tire defeats the purpose for which it is used. The tire makers have set down pressures which are the best compromise between the lack of resilience on the one hand and under-inflation on the other.

It will be of interest to many to know that there is no truth to the statement that tires should be run at a lower pressure in summer to take care of the greater expansion of the air in them and thus prevent undue strain which might cause blowouts. A careful test to see just what the result of hot weather running is proved conclusively to Mr. Litchfield that there is at the most not over a few pounds pressure increase through driving over hot pavements or roads, and this is really no difference at all so far as the welfare of the tire is concerned.

Another point of very vital interest is mentioned by this authority when he says that it is the flexing, not the direct tension, that causes a tire to fail or wear out prematurely. In other words, it is the downward variation in pressure that must be prevented. A downward variation in pressure may be due to a change in temperature or to leakage. We already have

seen that the rise in temperature due to hot weather and fast driving usually is of no consequence. Hence a downward variation due to a reversal or removal of these causes must also be rather small. There is another cause of cooling or contraction in a tire, however, that often may result in a very serious reduction of pressure. One need not be familiar with thermodynamics to know that when air is compressed it becomes heated. The ordinary tire pump has practically no provision for cooling the air. Hence it usually enters the tire in a rather heated condition; and, as it gradually cools again to normal temperature, there is a simultaneous drop in pressure.

With an efficient garage pump employing a storage tank, this drop in pressure may not be so large. Hand pumps are also comparatively free from this danger on account of their slowness of operation. When, however, a tire is filled completely by an ordinary engine pump, the motorist should be very careful to test his pressure again after about 1 hour has elapsed. The drop in pressure from this cause alone may often be as much as 15 to 20 pounds out of 80. If on the other hand a tire is inflated from an air bottle carrying a high pressure, the air enters the tire cold and the pressure will subsequently increase. In this case also it is well to check the pressure again a short time after inflating, if it is desired to keep it down to a certain figure. It should be understood, says Mr. Litchfield, that these remarks apply only when a tire is pumped up completely, or nearly so, with fresh air, as for instance in putting on a new tire. If only a few pounds of air is added for the purpose of maintaining the pressure, the effect of the heat of compression is negligible.

Pressure Variation Due to Leakage

The most serious variation in tire pressure is caused by leakage. Rubber is to a small degree a porous substance and will allow air under pressure to leak through it. This leakage, Mr. Litchfield explains, is not constant, being dependent upon the quality of the rubber, temperature, weather and conditions of use. A certain amount of leakage is also to be expected through both tube and valve. That is normal. Under very favorable conditions, the pressure may maintain itself for a considerable time, but it is never safe to count on this. The use of a reliable pressure gauge every few days is the only way to guard against the pressure dropping too low.

A motorist without a pressure gauge is very much like a carpenter trying to work without a rule.



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with
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are now
unknown

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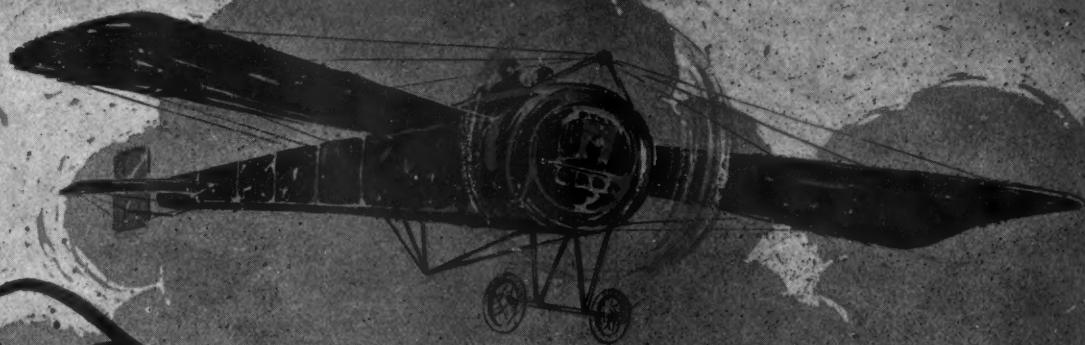
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When Writing to Advertisers, Please Mention Motor Age

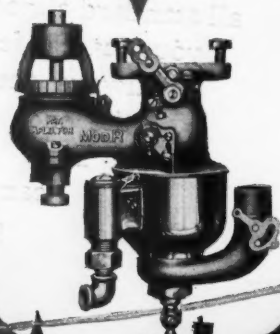


*The choice of birdmen who
place their lives in the hands
of their carburetor*

SCHEBLER

*as dependable in
everyday motoring
service as it is in the
clouds*

WHEELER &
SCHEBLER



INDIANAPOLIS
INDIANA



"Van"

*The speed-meter
with the big
black figures*

STANDARD EQUIPMENT ON

Apperson
Hercules
Hupmobile
Jackson
Jeffery
King
Pilot

*Flush Type
Black Face
Actual Size*

Note Van's
New Single
Wheel Reset

Jackson and Van are now climb-
ing hills and ploughing through
sand together.

Neither of them have been
stumped yet!

THE VAN SICKLEN COMPANY

AURORA

ILLINOIS

Factory Representatives: Cutting, Armstrong & Smith Sales Co., Detroit, Mich., for the States of Michigan, Ohio and Indiana

General Distributors: The Beckley-Ralston Company, Chicago

Foreign Distributors: Mestre & Blatge, 20 Store St., Tottenham Ct. Rd. W. C., London, England

KING ADVERTISING

PULLS WITH KING DEALERS THE YEAR 'ROUND



17

National Magazines
Circulation Over 5,000,000

33

Farm Papers
Circulation Over 2,500,000

21

Foreign and Export Publications
Circulation Over 500,000

152

cities and towns the country over have King street car advertising. *Millions of readers daily.*

Aggregate value of King advertising space, schedule of 1915, over

\$350,000.00

and thousands of additional dollars for catalogs, folders, brochures, posters, color proofs, electrotypes, and other DEALER HELPS.

The King Eight Cylinder at \$1350 was announced October 26, 1914. It is the pioneer popular-priced "Eight" and is King designed and King manufactured. Its success has surpassed the most sanguine hopes of its builders, and hundreds of King "Eights," all over America, are daily teaching motorists what they should *now* expect from an automobile. Our Chicago dealer has sold three trainloads of seventy-five cars

each in three months. In England alone ninety King "Eights" are successfully operating, and South Africa, Australia, Spain, Russia, Sweden, Venezuela, and many other foreign countries have purchased, then praised, this wonderful car. These export successes are the strongest proof of King "Eight" efficiency, as no "service" can be given and purchases are made only after the most exhaustive investigation.

A small amount of KING territory is still open. It may be in YOUR section! Wire and ask.

KING MOTOR CAR COMPANY, 1300 Jefferson Avenue, DETROIT, MICHIGAN

Invest your part of the \$15,000,000 Ford rebate



In a
**DISCO SINGLE UNIT
STARTING
and
Lighting System**

For Ford Cars

With Ward Leonard Control



When you get your share of the Ford profit millions, invest it in a DISCO Electric System, to improve your car.

Get interest on it from a better equipped Ford, with a higher market value and a real DISCO driving comfort. The DISCO Electric System spins your motor for starting, and carries current to the lamps. Automatically becomes a generator after fulfilling its duties as starter. Assures a car that always starts on the first trial, and a dependable, clear light for night driving.

Simple to Install and Operate

The DISCO Electric System, single unit, is the simplest type in operation, and the easiest to install. Gears and over-running clutches are eliminated. Motor-generator is identical with generator used in 2 unit system.

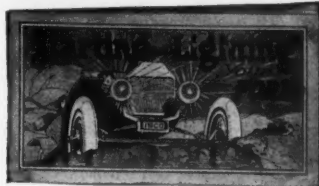
Your garage man can easily install your DISCO Electric System—or you can do it yourself, if you are accustomed to handling tools.

Most Economical Ford Starter

DISCO takes less power from the batteries. Cranks faster. Starts sooner. Gives batteries more, and longer life. In fact, DISCO is the electric system of 100% efficiency.

**Write Today for
FREE BOOKLET**

"Starting and Lighting your Ford"



Dealers—Get your share of DISCO business—and good profits—by writing for details today. This is a DISCO season.

Complete \$75
f. o. b. Detroit

DISCO ELECTRIC STARTER CO. DETROIT MICHIGAN

When Writing to Advertisers, Please Mention Motor Age



TEXACO MOTOR OIL

Meets the Demands of Every Motor

NO matter whether it be a ponderous 3-ton truck, a light pleasure car or a speedy motorcycle, Texaco Motor Oil will get the maximum power out of its motor.

Texaco Motor Oil retains its viscosity under heat. *It can not char.* By its use you eliminate hard carbon deposits on the piston and cylinder heads and the gumming of piston rings, valve and valve seats.

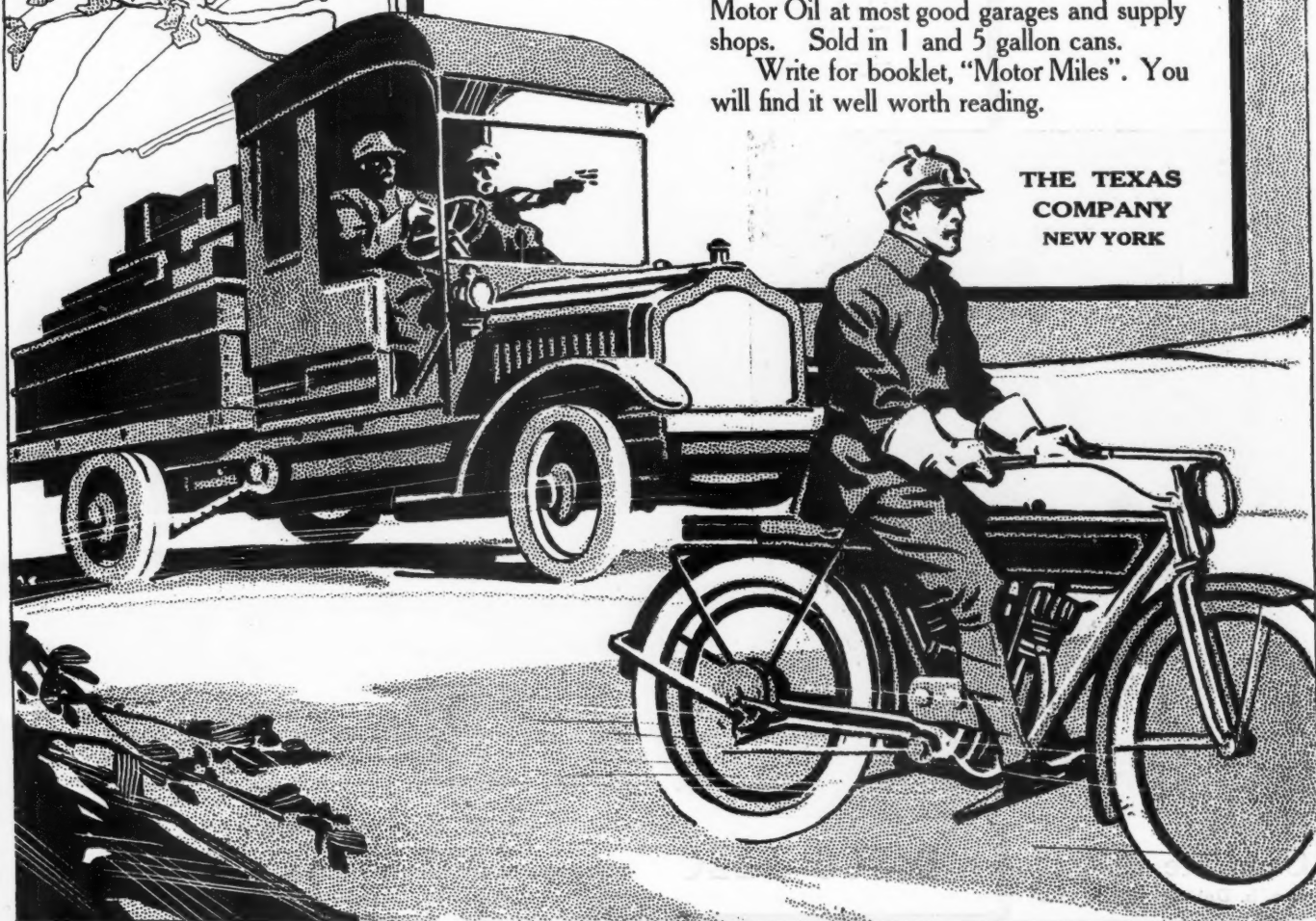
It means greater mileage, smaller gasoline bills and a quiet, easy-running motor.

Texaco Motor Oil lubricates perfectly under all conditions. It does its work just as well during the long, hard drive at "90 in the shade" as in the run through the snow at zero.

Test these statements for yourself. You can obtain Texaco Motor Oil at most good garages and supply shops. Sold in 1 and 5 gallon cans.

Write for booklet, "Motor Miles". You will find it well worth reading.

THE TEXAS
COMPANY
NEW YORK





Advertisers who make proper use of Motor World have a decided advantage with the worth while garagemen, dealers and jobbers throughout the United States.

Thousands of them subscribe for and read Motor World because it is *their* paper—designed and edited for the advancement of *their* business.

The wide-awake merchandisers of the industry—the men who sell cars, trucks, accessories, supplies and service—are learning more and more to depend upon Motor World for guidance and instruction.

Reach this army of purchasing units with your message.

Show them how to increase their money-making opportunities.

Every Motor World subscriber is a possible purchaser, in a whole-sale way, of your product. There is no waste circulation.

You have a message. We will provide the audience that can purchase your season's output.

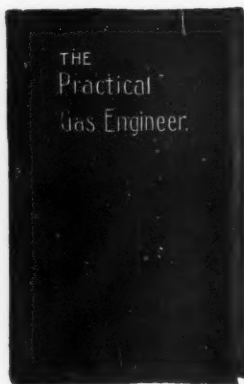
Considering the service rendered our advertising rates are low.

A copy of "Economy in Industrial Advertising" will be sent free and postage paid to any manufacturer or jobber who will address,

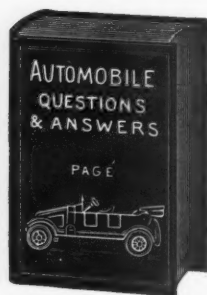
MOTOR WORLD

The Dealers' National Weekly

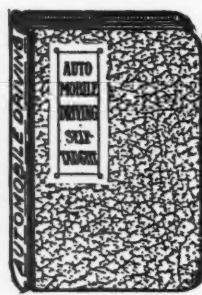
239 West 39th Street, New York



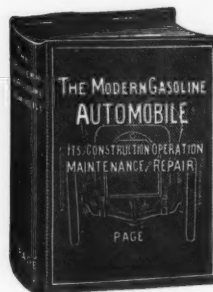
PRACTICAL GAS ENGINEER. By E. W. Longnecker. Twelve years' constant experience with Hydro-Carbon Engines. How to start, how to operate, and how to care for all classes of explosive motors or engines using gas, gasoline or similar fuels. A full and exhaustive chapter on electric and other systems of igniting. Every line tells something. Every page full of interest. A book of 172 pages, neatly bound in cloth. Sent postpaid on receipt of price, \$1.90.



QUESTIONS AND ANSWERS relating to automobile design, construction and repair, by Victor W. Page. A practical treatise consisting of a series of 36 lessons, covering some 2,000 questions and their answers. Subject matter is correct and explained in simple language. A feature of this book is the treatment of some of the most important motor ailments, their causes, effects and cure. Price (cloth) \$1.50.



AUTOMOBILE DRIVING SELF - TAUGHT. By Thomas H. Russell, M.E., LL.B. An exhaustive treatise on the Management, Care and Operation of Motor Cars. Pocket size, 230 pages, liberally illustrated, handsomely bound in black seal flexible leather, round corners, red edges. Price, flexible leather, \$1.50.



MODERN GASOLINE AUTOMOBILE. By Victor W. Page, M.E. Its construction, operation, maintenance and repair. 700 pages, 500 illustrations. A late and complete treatise on the modern motor car. Free of technical terms, yet complete in every detail. Covers all phases of motor car practice. Price \$2.50.



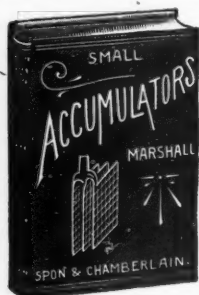
IGNITION, TIMING AND VALVE SETTING. By Thomas H. Russell, M.E., LL.B. Pocket size, 225 pages, fully illustrated. A comprehensive illustrated manual of self-instruction for Automobile Owners, Operators and Repairmen. Price, cloth binding, \$1.00.

TEN BOOKS that cover the entire automobile field are here offered at from 50 cents to \$3 per copy. Any book mailed postpaid on receipt of price. Order from

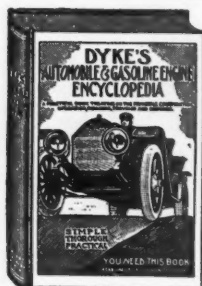
THE CLASS JOURNAL COMPANY
910 South Michigan Avenue, Chicago

SELF-PROPELLED VEHICLES. By James E. Homans, A.M. A practical treatise on the theory, construction, operation, care and management of all forms of automobiles, with upwards of 500 illustrations and diagrams, giving the essential details of construction and many important points on the successful operation of the various types of motor carriages driven by steam, gasoline and electricity. This is probably the best comprehensive treatise published in simple language, so that the contents may be readily understood by the intelligent reader. It is an excellent work to begin with before going deeper into the subject. Size, 5 1/4 by 8 1/4. Pages, 652. With Drawings and Half-Tones. Cloth \$2.

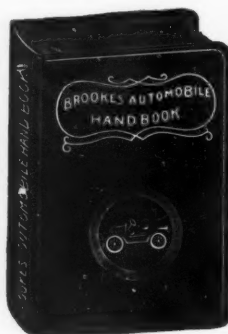
SMALL ACCUMULATORS. How Made and How Used. By P. Marshall. An elementary handbook for students and beginners, discussing theory and practice in the construction of small storage batteries, with instructions for charging and using batteries. Size, 4 1/4 x 6 1/2. Pages, 80. With illustrations. Cloth boards, 50 cents.



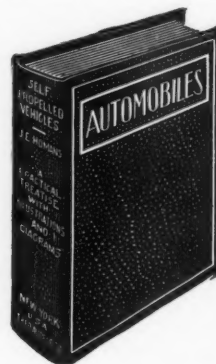
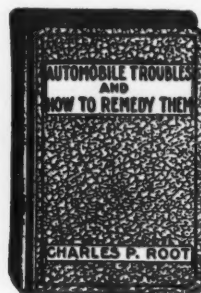
DYKE'S AUTOMOBILE ENCYCLOPEDIA. by A. L. Dyke, E. E. 656 pages. Over 1,200 illustrations. Teaches the Principle, Construction, Operation and Repairing of cars and engines. Covers all valve systems; ignition; carburetion; care of car; adjusting and repairing; digest of troubles; a good index, which is handy for the repairman. Electric Starting and Lighting Systems; six, eight and twelve cylinder engines. Simplified so anyone can understand. Prepared for the novice, but a handy and reliable reference guide for the expert. Price \$3.00.



THE AUTOMOBILE HANDBOOK. By L. Elliott Brookes. 700 pages and over 320 illustrations. New enlarged edition. Popular edition. full leather limp, \$2.00 postpaid. A work of practical information for the use of Owners, Operators and Automobile Mechanics.



AUTOMOBILE TROUBLES AND HOW TO REMEDY THEM. By Charles P. Root, former editor "Motor Age." Pocket size: 5x7 inches, 252 pages, illustrated, handsomely bound in red flexible leather, round corners, red edges. The only book of its kind published. It not only tells you how to locate troubles and make repairs, but shows you. Price, flexible leather, \$1.50.



(1)



PRICE of the
Packard
"TWIN-SIX"

the most sensational car
of the season, includes as
regular equipment, the
most expensive accessory
of its kind — a

WALTHAM
AUTOMOBILE CLOCK

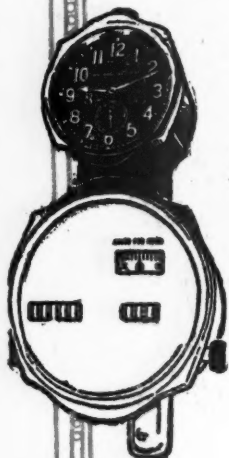
WALTHAM

WATCH

COMPANY



WALTHAM 8-day multi-jeweled time pieces are selected as stock equipment for *most* of America's finest cars. The following is a partial list—



Special
Packard
Model
for Twin
Six dash

ANDERSON (electric)	BREWSTER
CADILLAC (new limousines)	CRANE
HAYNES	HOLBROOK
JEFFERY	LOCOMOBILE
LOZIER	MARMON
OWEN-MAGNETIC	PIERCE-ARROW
RAUCH-LANG (electric)	ROLLS-ROYCE
SIMPLEX	STEARNS (new model)
WINTON	

WALTHAM Automobile Clocks are not only the best instruments ever devised for motor car usage, but they also have all the outward beauty which characterizes our fine timepieces.

The car manufacturer who thinks enough of the equipment on his car to use so choice an instrument as the WALTHAM Automobile Clock is likely to have used the same sagacity and expenditure in purchasing other requisites.

You can obtain a WALTHAM Clock on your new car by a friendly insistence at the time of purchase.



They have a warning signal which notifies 3 days before the clock runs down, thus avoiding the necessity for resetting.

Special
Model for
Packard
enclosed bodies

WALTHAM

WATCH

COMPANY

1916 CROW ELK-HART
 "Made to
 Make Good" **\$725** Electrically
 Equipped
 Startling Announcement



NEW MODEL CE-30

More Car Lighter Weight Greater Power

The 1916 CROW ELK-HART contains all the high-grade features of our last season's thirty-five horsepower model—our famous E-45 which sold for \$1150. But the price is \$425 less. It has the same style streamline design, the same high-grade blue-black finish, more horsepower per pound, with efficient long five-inch stroke motor—but this car weighs 650 pounds less. Increased factory production and greater factory efficiency make this wonderful motor car value possible.

In detail, finish, mechanical fineness, comforts and conveniences this 1916 model gives you ALL there was in our highest priced cars—and it sells for but \$725 completely equipped.

SPECIFICATIONS:

Wheel Base 112 inches
 Motor 3½"x5"
 FULL Floating Rear Axle
 Improved Multiple Disc Clutch
 Full Five-Passenger Body
 Latest Streamline Design
 Oval-Shaped Radiator
 Underslung ¾ Elliptic
 Springs in Rear

Left-Hand Drive; Center Control
 Built-In Double Ventilating Rain-Vision
 Windshield
 Instrument Board on Cowl Dash
 Thermo-Syphon Cooling
 Headlight Dimmers
 32" Wheels—3½" Tires
 Demountable Rims with Extra Rim
 Disco Starter and Lighting System

And Note the Weight—1,950 Pounds

The Triumph of Our Seven Years in Motor Car Building

Get Our Proposition Quick!

Crow Motor Car Co.,

1600 No. Main St.
 Elkhart, Indiana

DEALERS!

Don't judge this car by its price.

Investigate for yourself.

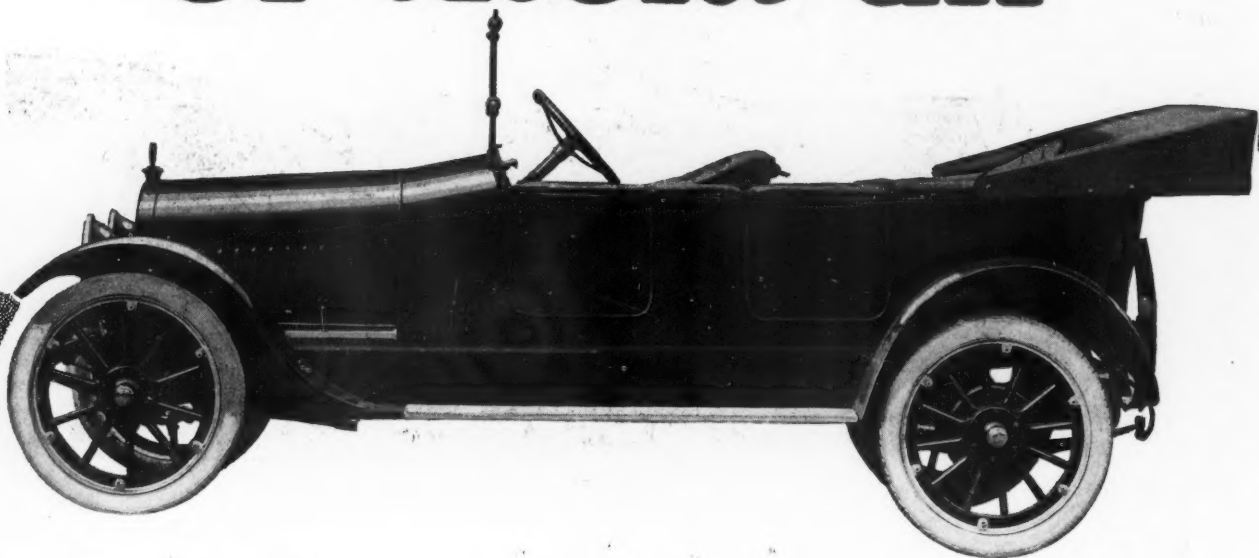
Write or wire NOW or come to factory.

More than 200 dealers are selling the CROW ELK-HART.

With this car you can get your share of the 1916 business.

Monarch

of them all



An Eight-Cylinder Master Car at \$1500

THE appeal of the Eight-Cylinder car is irresistible. It marks a new and greater era in motor car development. It took the public several seasons to realize the advantages of the "Six," but its acceptance of the superior advantages of the "Eight" has been instantaneous and world-wide.

The MONARCH "Eight" reveals the higher type of car made possible by specialized production of every part which goes to make up the finished machine.

Its simplicity,—comparable to the "Four" rather than the "Six"; its lightness,—far lighter per horse-power than any other type; its matchless flexibility and fascinating smoothness of action; and withal its moderate price, challenge the attention and compel the admiration of discriminating buyers.

The MONARCH "Eight" brings added zest and new pleasures to motoring. It relieves the strain from long distance travel, it makes hill climbing a pleasure, it makes safe and easy the threading of crowded traffic or tortuous roads.

These Tell the Story

Motor—Herschell-Spillman unit power plant, designed for high speed operation, developing 74 horse power at 2400 r. p. m. Three point suspension. 3 x 5, V-type, staggered, with a separate bearing for each connecting rod.
Rear Axle—Yuster, full floating. Spiral bevel gears.
Carburetor—Zenith.
Ignition—Atwater-Kent automatic advance.
Clutch—Multiple disc, dry plate.
Lubrication—Force Feed.

Starting and Lighting—Ward-Leonard.

Fuel Feed—Stewart vacuum system.

Mileage—15 miles to the gallon.

Weight—3,000 pounds filled ready for the road.

Wheelbase—125 inches.

Body—Latest streamline. Seven-passenger with folding auxiliary seats. Front seats divided. Deep Turkish tilted cushions. Upholstery long grain bright leather.

Equipment—Absolutely complete. Electric lighting system with generator; special two bulb lamps; motor driven horn; power tire pump; clear vision, rain vision windshield; one man mohair top with quick adjustable curtains and Gilliam top support; Stewart flush type speedometer, ammeter; gasoline gauge; all instruments on instrument board; cowl lamp with trouble lamp attachment; tools; repair kit; jack; duplex tire carrier; one extra rim; robe rail; foot rail; carpets front and rear.

Back of the MONARCH is an organization of men of wide and successful experience in the automobile field. The company's resources are abundant. Experienced management and efficient methods, backed by the purchasing power of ample capital, have made possible this remarkable car at a remarkable price.

In every respect the MONARCH "EIGHT" is a distinctive and exceptional car—a tested and proven success. The layman can appreciate its superiority as easily as the engineer. It satisfies a live and growing demand.

The MONARCH "Eight" as here illustrated has a roomy seven-passenger body with divided front seats. The eight-cylinder motor gives perfect flexibility, quick pick-up and silence. It has less weight per wheel-base-inch and per horse-power than any other car of equal size and capacity. It is strong, sturdy and reliable. It has distinctive style in design, the highest grade of finish and is upholstered in long grain bright leather. The equipment is complete to the smallest detail.

Our Dealers Proposition

Our deliveries on the MONARCH "Eight" started early in June. We are closing territory rapidly. Write or wire us today.

We are building 5000 cars for the present season, and the way specifications are coming in you will have to act promptly to take advantage of our exceptional dealer's proposition.

Monarch Motor Car Co.

Detroit, U. S. A.



Dynamometer and Road Tests Show

JUMBO SPARK PLUGS POWERFUL

FAST

ENDURING

Sell the Plug you would buy for your own use

When you buy a set of spark plugs do you ask for an analysis of the steel or what degree of heat is attained in baking the porcelain?

It wouldn't do you a bit of good to know.

But what you are interested in is whether the plugs you buy will stand up—fire each charge of gas however fast you drive and whether the plugs will deliver a hot, fat, energetic spark.

These are the practical things a plug can do for a motorist and these are the things we know

Jumbo Spark Plugs

will do for you. We know because we have tried them out—in laboratory tests and on the road all during their development period—over two years—summer and winter—in all kinds of motors—Knights—poppet valve motors—high speed—high compression motors, aeroplane motors, marine motors, etc.

Ask for your trial set of JUMBO PLUGS—read the guarantee of one year's service. It not only guarantees JUMBO PLUGS to give you satisfaction for a year but it guarantees that each plug has been carefully inspected and tested before leaving our factory. Your satisfaction is guaranteed from the moment you put a set of JUMBO PLUGS on your motor and every minute you drive your car for at least a year. This also is a guarantee of your customers' satisfaction.

Making JUMBO PLUGS as good as they are costs too much for us to afford this guarantee unless we made sure of their service first. Selling JUMBO PLUGS insures clean-cut business—growing trade—good profits from the start and better profits in the long run.

Write for your set on your own business stationery—you will be sure to get them then

Gibson-Hollister Manufacturing Co.

3380 Washington Street

Boston, Mass.

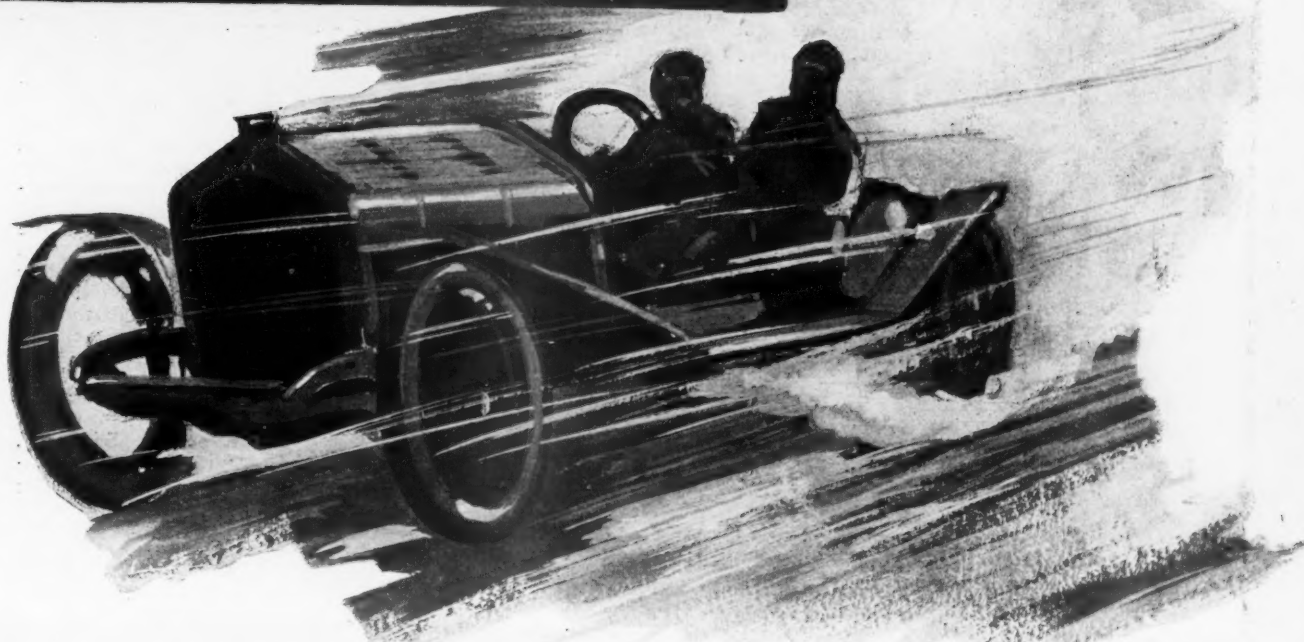
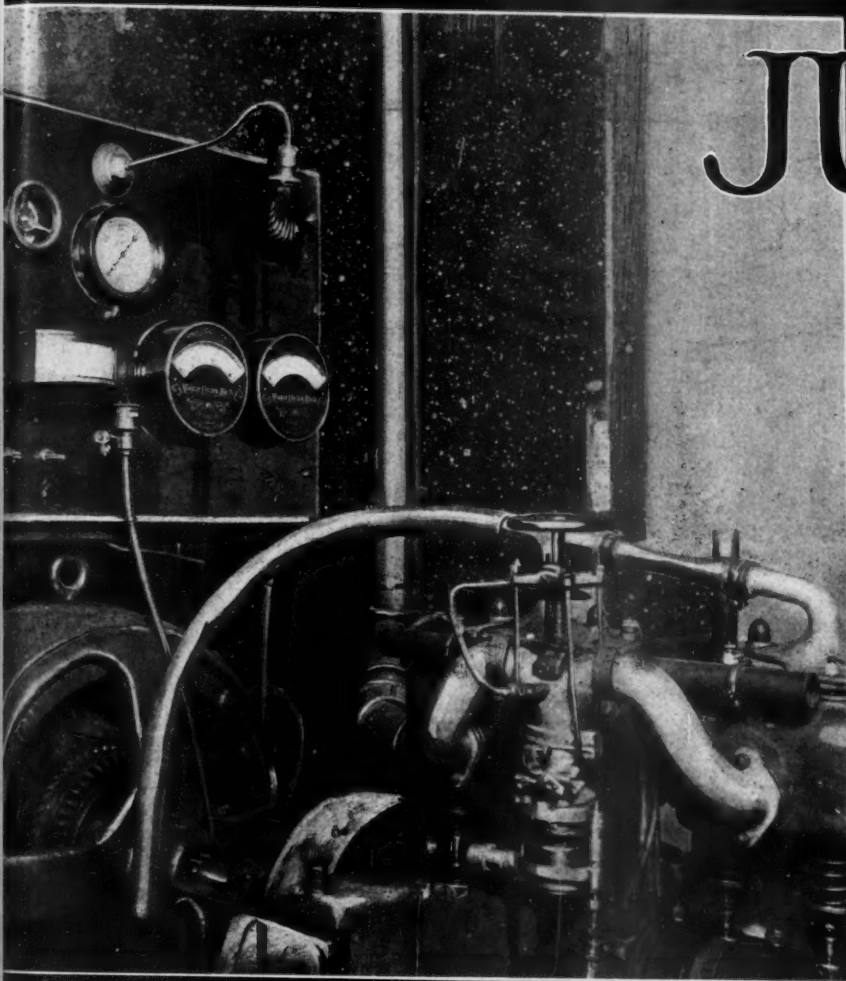
When Writing to Advertisers, Please Mention Motor Age



JUMBO



SPARK
PLUGS



When Writing to Advertisers, Please Mention Motor Age



Don't wait another Protect your life of others with

STOP at your favorite dealer's today and invest a \$5 bill in a high-grade, hand-operated Stewart Warning Signal, the only "accident insurance" which PREVENTS accidents. Protect yourself and your family, and warn all others by the Stewart Warning Signal, with its loud, penetrating blast for country roads, and its sharp, inoffensive note for city streets.

By spending a \$5 bill today for a Stewart Warning Signal, your life, and the life of some other person, may be saved. One serious accident may cost you many hundreds of dollars.

When you see the name Stewart on the signal you buy, you can be sure that you are getting the best there is, regardless of price.

An important feature of the Stewart is the swivel-bracket, which is adjustable, so that no matter where you mount the Stewart Warning Signal on your car, the warning blast can always be directed straight ahead.

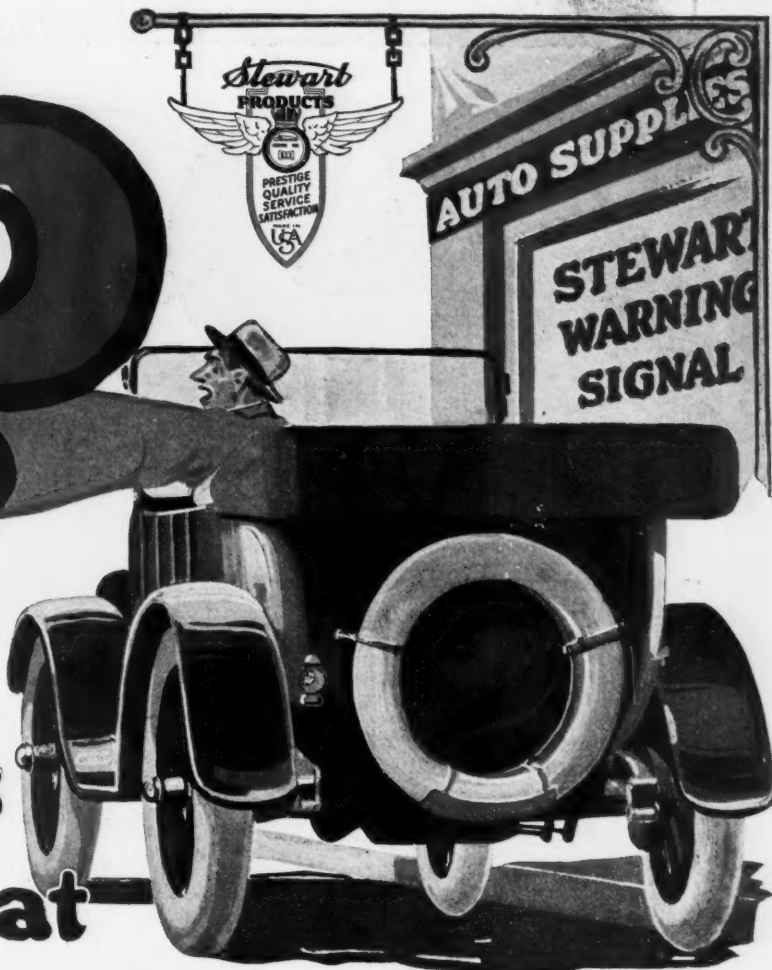


No other Warning Signal is so adaptable, or can be placed in so many different positions, inside or out, on any car. You can operate it without taking your hand from the steering wheel. You can place it where you can sound it at the touch of the finger, hand or elbow, or with your knee or foot.

An important feature of the Stewart Warning Signal, with its long, vertical plunger, operated at a touch by a direct downward stroke, the quickest, easiest and proper

OP

minute and the lives a signal that will MAKE them pay attention the *Stewart* Warning Signal



way. Warning Signals with horizontally built plungers, or plungers built on an angle, have to be reached for, and pushed or pulled, and it takes longer to reach and operate them than it does to sound the Stewart Warning Signal. Every fraction of a second counts.

The public always wanted a high-grade, hand-operated Warning Signal. We deliberately and carefully designed the Stewart Warning Signal to meet this great need, and the public has virtually stampeded to the Stewart Warning Signal—over 2,000 being sold every day!

The Stewart Warning Signal is handsomely finished in black enamel and nickel (or black and brass finish for Ford cars). Special models for Motorcycles and Trucks.

Any Dealer or Garage Man or any Stewart Branch or Service Station in every part of the country, no matter where you live, will put a Stewart Warning Signal on your car in 5 minutes.

Installed FREE.

30 Days' Trial Offer

If not absolutely satisfied after 30 days' trial your money is cheerfully refunded. Fully guaranteed.

Stewart-Warner Speedometer Corporation

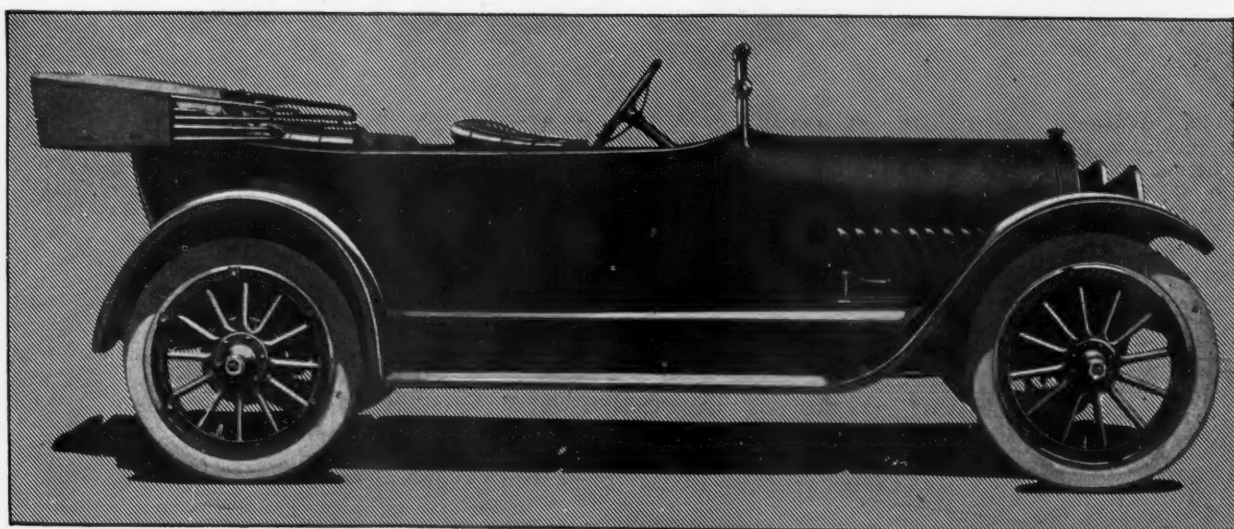
Executive Offices: 1933 Diversey Blvd., Chicago Factories: Chicago and Beloit, U. S. A.
15 BRANCHES { Boston Buffalo Chicago Cleveland Detroit Indianapolis Kansas City Los Angeles
 Minneapolis New York Philadelphia St. Louis San Francisco London Paris
78 SERVICE STATIONS IN ALL CITIES AND LARGE TOWNS

*The Most For The Money***\$985****Money Talks**

Four cylinders, T-head cast en bloc, 3 $\frac{1}{2}$ x5. Unit power plant. Three point suspension. Cantilever springs. 114 inches wheel base, with standard 56 inch tread. Left side drive and center control. Electric lights and electric starter. Crown fenders, enclosed front and rear. Full U doors, with invisible hinges. New style electric headlights, with small auxiliary lights for city driving. Two piece clear vision ventilating windshield. One man top. 34x4 tires, demountable rims. Fully equipped without extra cost. \$985.

LISTEN to this money-logic, against which mere bombastic claims are futile. You, Mr. Dealer, are in business *to make money*. The car owners want the car that gives them the most for *their* money. Both these demands are met by the *Auburn* for 1916.

The Auburn's performance is what makes its price low. It is not a skimped car—but more actual worth is added to it. The wonder is that the price was not raised instead of lowered. This is why, already a nationwide demand exists for the Auburn, because it is within reach of all the pocketbooks in the small towns, as well as in metropolitan

*The Most For The Money**The Most For The Money*

The Most For The Money

Auburn

Motor Cars

for 1916

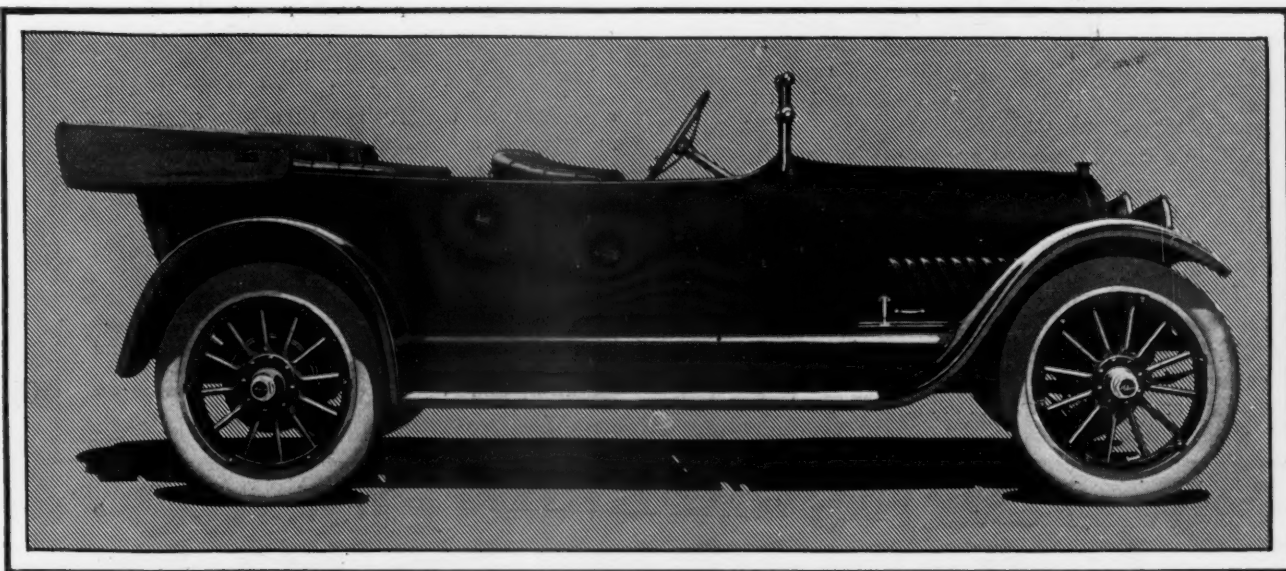
Announcement

cities. And because the public gets a *better* car than ever before and not a makeshift to meet a price. Auburn's sixteen years success and reputation is the best guarantee on earth for dealer and owner.

Write at once for complete information. We have an attractive dealer's proposition to offer the right man—*no matter how small your home town*. It costs you nothing to find out.

Auburn Automobile Company
AUBURN, INDIANA, U. S. A.

Six cylinders— $3\frac{1}{2} \times 5$.
A new and improved series of a successful and popular car.
Center control—left side drive.
Electric lights—electric starter.
Cantilever springs.
Roomy, comfortable and beautiful bodies.
Upholstery of carefully selected stock with exquisite finish.
One man top. 34 x 4 tires, demountable rims.
Crown fenders—stream line bodies.
126 inches wheel base.
Spacious tonneau—folding and disappearing extra seats.
Ample room for seven passengers.
\$1550.
Full equipment without extra cost.

The Most For The Money*The Most For The Money*

J-M Automobile Accessories



Long Horn

The horn that warns. Finest materials used in construction. Model "J" hand horn (illustrated) \$5—guaranteed for all time. Other models for electric operation. Prices \$5 to \$12.50.

Johns-Manville Shock Absorber

A REAL shock absorber, simple, efficient and easily attached.

Money back if not all that we claim. Price per pair \$15



J-M Lens (Non-Blinding)

Renders headlights non-blinding, but without sacrificing the needed road illumination. For all standard makes of lamps, per pair, \$3.25.



J-M Auto Clock

Keeps excellent time. Runs 8 days without rewinding. Setting and winding keys concealed. Fittings of car. Two dash, each \$5.

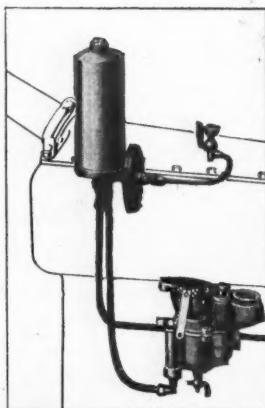


Goods of known quality backed by a known organization are unquestionably the safest goods to buy.

For over half a century the name Johns-Manville has stood as a guarantee for products of proven excellence.

One Firm One Service One Guarantee

The Carter Automatic Gravity Gasoline Tank



will furnish a constant gravity flow of fuel to your carburetor no matter where your main tank or carburetor is located.

It does away with the annoyance and uncertainty of a pressure feed system. And, unlike any other gasoline system, it insures an absolutely uniform flow of fuel to the carburetor at all engine speeds.

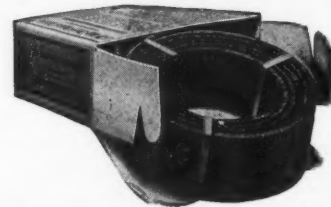
The absolute positiveness of its action, the simplicity of its few parts and the fact that it does not depend for its efficiency on air-tight lines make it the most satisfactory solution to the fuel feed problem.

If your dealer cannot supply you, write us at once.

Price complete, with all necessary fittings, for application to any car, old or new..... **\$10**

3126

J-M NON-BURN BRAKE LINING



Economy Commends It Safety Demands It

For economy as well as safety, insist that your brakes be lined with genuine J-M Non-Burn Brake Lining.

J-M Non-Burn has the gripping power essential to the fullest measure of safety and the long-wearing quality necessary to the fullest measure of service.

It is honest brake lining backed by a long experience in the manufacture of brake linings for heavy industrial machinery, where the requirements are infinitely more severe.

And the fact that it has successfully met these requirements is the best assurance that it can and will meet yours.

Sold by good dealers everywhere. Write today for booklet.

3125

H·W·JOHNS - MANVILLE CO·

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Rochester
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St. Paul
Salt Lake City
San Francisco
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THE CANADIAN H. W. JOHNS-MANVILLE CO., LIMITED

Toronto Montreal Winnipeg

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When Writing to Advertisers, Please Mention Motor Age

**Largest and Best Motor—(3 $\frac{3}{4}$ x5 "40" Continental)
Westinghouse Starting and Lighting
4 inch Tires, 115 inch Longest Wheelbase
on a Car Listing Less Than a Thousand**

This IMPERIAL is greatest four cylinder value of 1916 season. Have you a car to meet this demand? If not, write IMPERIAL, JACKSON, MICHIGAN

1916 Delivery Now
Imperial

FOUR

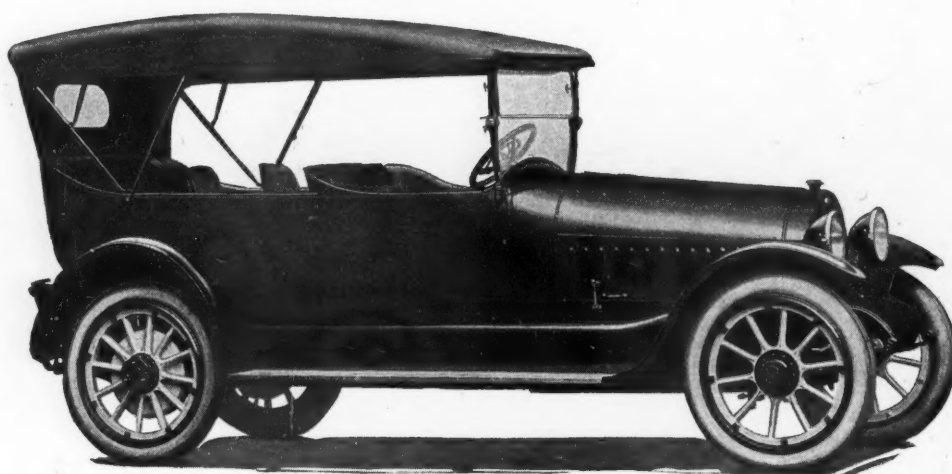
\$995



When Writing to Advertisers, Please Mention Motor Age

THE EASIEST-RIDING CAR IN THE WORLD

A New Series Marmon "Forty-One"



Superlative of Body Refinement

THE new series Marmon "Forty-One" is chiefly remarkable because of an extraordinary development in body design and construction. The finest of automobile chassis is now fitted with bodies which, like the mechanism, leave nothing to be desired. The beautiful sheet aluminum touring car bodies

are lighter in weight—stronger, roomier and better in finish and details—giving greater comfort and more pleasing lines. The greatest forward step in the upholsterer's art is shown in the new straight pipe upholstery which gives a new and added luxury to these distinctive new designs.

The new series Marmon "Forty-One" is furnished in Five and Seven-Passenger Touring Cars—the "Club" Three-Passenger Roadster and Two-Passenger Speedster Bodies—the most beautiful and distinctive bodies America has ever produced

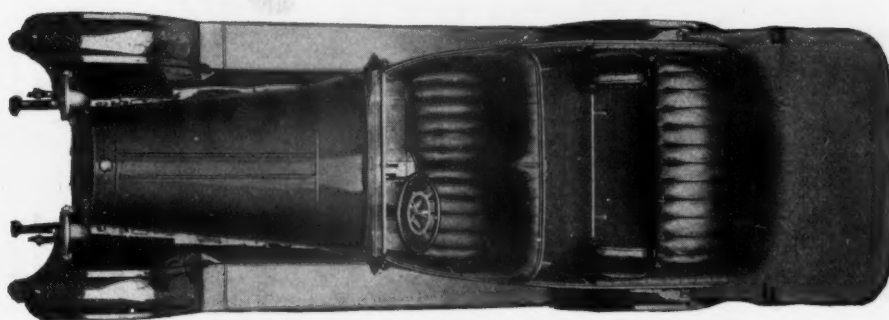
Nordyke & Marmon Company

Indianapolis (Established 1851) Indiana

OVER SIXTY YEARS OF SUCCESSFUL MANUFACTURING

THE EASIEST-RIDING CAR IN THE WORLD

A New Series Marmon "Forty-One"



No Change in Chassis

THERE is not a material change in the chassis of the new series Marmon "Forty-One."

The proven six-cylinder Marmon engine—the famous Marmon oiling system with the specially designed enclosed cam shaft—the wonderful Marmon clutch—spiral bevel drive—Bosch electrical system—and many other details, combine to make the "41" chassis

the highest example of mechanical excellence. We could not improve them.

The result is a car that excels in acceleration—hill-climbing—speed—endurance—every point convincingly proven by the actual performance of stock cars during the past season.

The price is unchanged.

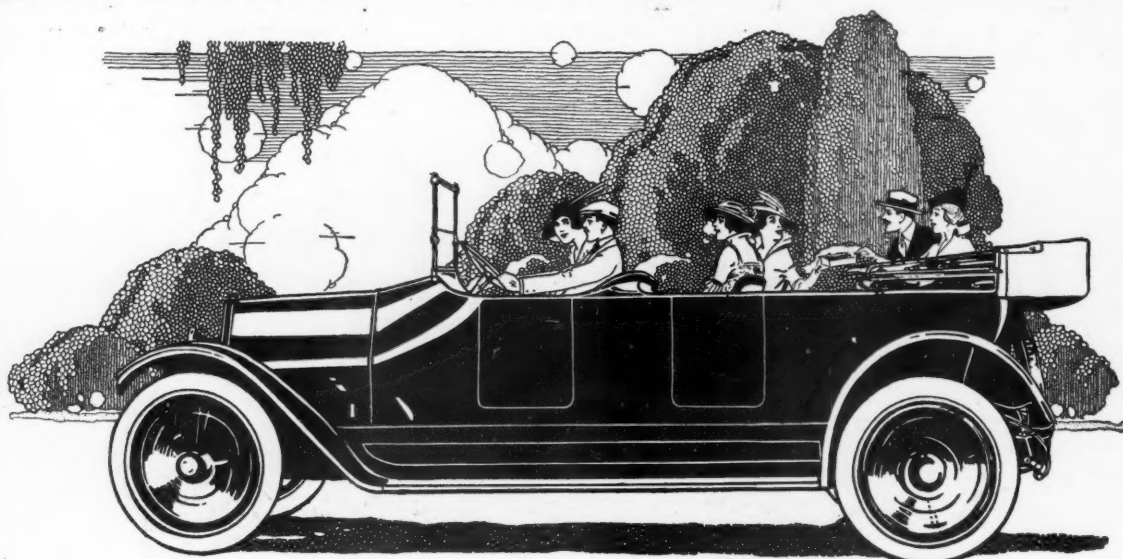
The value is backed by our standing offer—"Make us prove it!"

Dealers who appreciate that real value, not attractive promises, sells automobiles—who know the profits of dealing with the big man of the community—will get the details of this Marmon proposition. How about proving it to you?

Nordyke & Marmon Company

Indianapolis (Established 1851) Indiana

OVER SIXTY YEARS OF SUCCESSFUL MANUFACTURING



You will be glad you waited for the new series Lewis "VI"

Looks, action, power, utility, durability, luxury—all these qualities are present in the big, beautiful, powerful, all-purpose, new series Lewis Six.

Capt. William Mitchell Lewis, a pioneer in the automobile field says: "After twelve years, at last I am satisfied—I can do no more. Here is the logical, all-purpose automobile, a six-passenger, six-cylinder car that I am confident has no competitor in its class." In the new series

LEWIS "VI" Monarch of the Sixes

there are 1200 fewer parts. Think of the everlasting convenience of this feature. Think what 1200 fewer parts mean in the way of low cost of up-keep—less "trouble"—a more understandable automobile. Read the specifications—they make the new series Lewis Six a \$3000 car in every thing but the price. The price is \$1600.

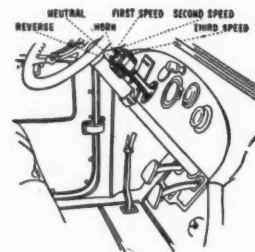
DEALERS — If we are not represented in your territory, write today for a proposition.

L. P. C. Motor Co., 57 CRAM STREET Racine, Wisconsin

Specifications:

135-inch wheel base and 56-inch underslung rear springs, easy riding and comfort on country roads. Reserve gasoline supply—Stewart vacuum feed—Remy starter—Stromberg new type carburetor—Stanweld rims—power tire pump—Crown fenders—a car of "class" from radiator to tail-light.

Magnetic Gear Shift



When your Lewis Six is equipped with the C-H Magnetic Gear Shift, you can drive it as easily as an electric coupe. No stripping or clashing of gears. The Magnetic Gear Shift is optional at \$150.00 extra.

COVERT TRANSMISSIONS

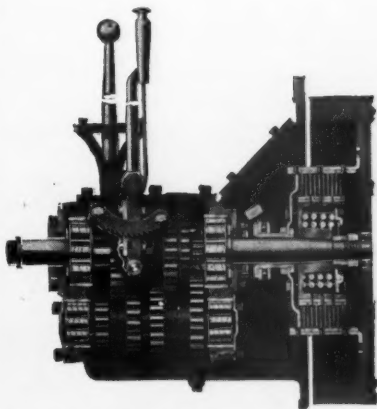
Right Design
Material
Workmanship

have made their impression on
automobile designers and engi-
neers with the result that

Covert Transmissions

are specified for pleasure cars and mo-
tor trucks by noted men of the auto-
mobile industry.

This recognition of true merit is the
result of fifteen years of specializing
in the production of trouble-free
transmission units. COVERT trans-
missions are made in a full line of
types and sizes and our engineers will
gladly show how easily our product is
adapted to your particular needs.



The New Covert Unit Power Plant Trans-
mission with Clutch and Control
Levers

Covert Motor Vehicle Company

Sales Office
Detroit, Mich.

Factory
Lockport, N. Y.

Velie

To Make This the Dominant Six Value for 1916

—We have concentrated all our experience and unusual facilities on this new car. Its power plant the latest development of the world famed six-cylinder specialists—its flow of energy continuous, silent, supple, adequate to every road and grade—its body lines forming the graceful sweep of the true boat-streamline—its capacity ample five-passenger, with every appointment for luxurious riding—its equipment surpassing all previous offerings—its weight, less than 2500 pounds, insuring economy of upkeep—all at \$1065.

Read the specifications on the next page. Better still, see the car. We are now making deliveries every day.

With this new model priced \$530 lower, the Velie demand is certain to break all bounds.

This means, for one dealer in every locality, a great opportunity.

It means a car which on simple comparison will

easily outsell any other car of its class. It means a car backed by reputation and money — by efficiency and experience.

Our national advertising campaign—*specially planned to help the dealer*—is just beginning.

We invite immediate correspondence. Or better still, come to the factory at once. Write or wire for appointment. *Get our liberal proposition.*

Velie Motor Vehicle Co., Moline, Ill.

"The Name Insures the Quality"

\$1065

When Writing to Advertisers, Please Mention Motor Age

Six

Read the Remarkable Features of the 1916 Velie Biltwel

Motor—Six-cylinder Velie Continental, cast en bloc, with removable cylinder head. 3¼-inch bore, 4½-inch stroke. Unit power plant.

Crank Case—Pistons removable through bottom. Pressed steel oil well. Oil level indicator.

Crank Shaft—Three-bearing with side surfaces. Fly-wheel bolted on flange.

Valves—Interchangeable. Completely enclosed by hand plates. Heads and seats entirely exposed by removing cylinder head.

Front Drive—Pump and camshaft driven by train of spur gears. Quiet and positive.

Cooling System—Large honeycomb radiator. Centrifugal water pump—16-inch belt-driven fan.

Ignition—Remy, with automatic spark advance.

Lubrication—Constant level system; pressure feed to bearings. Oil indicator and filter.

Carburetor—Float-feed type; hot air supply; air adjustment on dash; Velie Stewart vacuum feed; 15-gallon tank at rear.

Wheel Base—115 inches. Tread standard 56 inches.

Wheels and Tires—5½x4 front and rear. Non-skid on rear. Endless demountable rims.

Control—Left drive with change gear and emergency brake levers in center. Levers out of the way, giving entrance from either side.

Clutch—Velie dry plate clutch; completely enclosed in housing; easily adjustable.

Transmission—Selective type. Three speeds forward and reverse. Rocking lever shift. Nickel-steel gears.

Axles—Front axle 1-beam section, drop-forged from nickel steel. Rear axle, floating type; drive members easily removable.

Frame—4½-inch extra heavy channel-section pressed steel. Single drop; no offset.

Springs—Front springs, 37x2 inches; suspended under frame. Rear springs, 48x2 inches; underslung; hung adjacent to wheels.

Steering Gear—Worm and sector type; adjustable; self-lubricating bearings.

Electric Lighting and Starting—Two-unit Remy system. Starter geared to flywheel, engaged by simple pressure on button. Any combination of lights controlled by single dash switch.

Equipment—One-man top and envelope; quick adjustable side curtains; ventilating rain-vision windshield; Stewart speedometer driven from propeller shaft; electric dash-light; portable light; coat rail; foot rail; electric horn under hood; five demountable rims; full tool equipment.

Model—Boat-type streamline body, blending into tapering hood and curved radiator. Velie permanent mirror finish 20 operations deep. Full 5-passenger with ample room in front and rear. All for \$1065.

Get the full details of this remarkable car at once. Illustrated folder fully describing the new Velie Biltwel sent on request

Velie Motor Vehicle Co., Moline, Ill.



When Writing to Advertisers, Please Mention Motor Age

Trade-mark



Registered, U. S. Pat. Off.

Get that guarantee— 4c a day or less

If you own an Overland, Buick, Hupmobile, or any other car of less than 3000 pounds, the most perfect shock absorber service should not cost you over four cents a day.

We guarantee that it will not if you buy the Z² J. M. Shock Absorber.

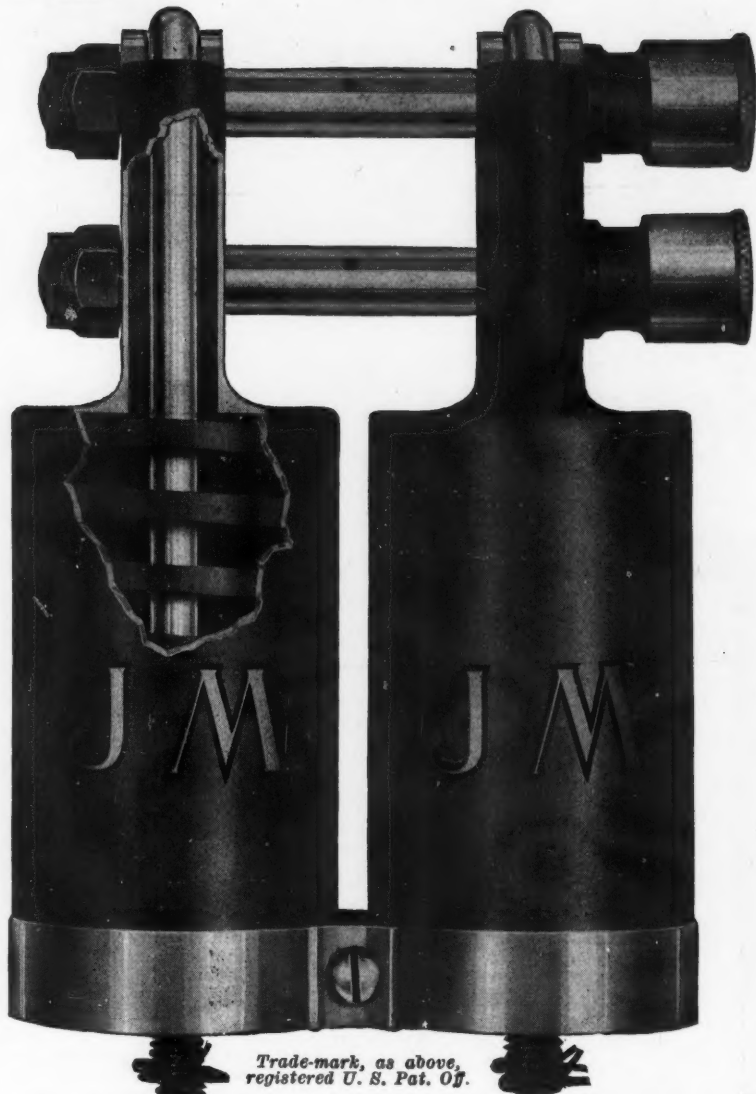
The latest word in shock absorber perfection—costs you only \$30.

Carries a two-year guarantee.

Practically everlasting. Takes up all the wear with a perfected bushing of Non-Gran Bronze, which is replaceable at trifling cost after the two years.

Let the J. M. representative in your city explain the new construction—show you the practical air chamber and the new grease cups on this perfected shock absorber.

Or write for our illustrated leaflet "M"—and our special proposition to dealers.



Trade-mark, as above,
registered U. S. Pat. Off.

J. M. Shock Absorber Type Z²

guaranteed for two years' service

THE J. M. SHOCK ABSORBER CO., Inc.

Main Office and American Factory:

210 South 17th Street, Philadelphia

FACTORY BRANCH: 250 West 54th St., New York

BRANCHES in every leading city. Look up "J. M. Shock Absorbers" in your telephone book. Do not confuse with any other concern of similar name.

Branches in every Civilized Country.

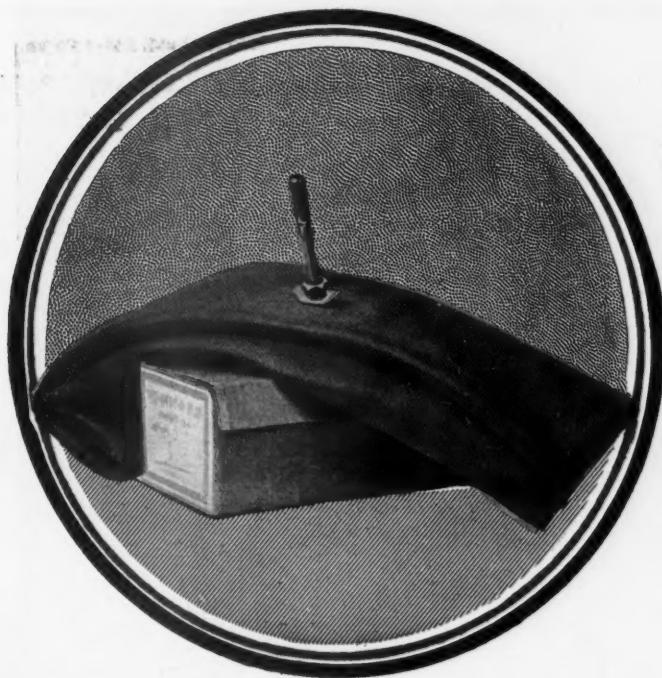
CANADIAN DISTRIBUTORS: Canadian Fairbanks-Morse Co.

Distributors of Cored Bars of



Get the famous 6-54 assortment

When Writing to Advertisers, Please Mention Motor Age.



Before You Buy Another Tube--- Think This Over

More tires are ruined through the use of cheap, faulty tubes than through any other cause.

We know. We make tires and consequently we make adjustments, and nine times out of ten when examining a ruined tire we find that a cheap porous tube was the actual cause of the damage.

The Reason

The best tire in the world will break down and rim out if it is not kept properly inflated. This is because the fabric in an insufficiently inflated tire is being constantly subjected to an abnormal breaking strain which eventually causes the layers, which compose the carcass, first to crease—then to break and—then to blow out. When a tire is at all soft and inclined to "give" when it strikes a bump, the strain on the fabric becomes terrific. It can't stretch, consequently it must give.

Cheap Tubes Are Not Cheap

It is impossible to keep even a good tire properly inflated if it contains a cheap, faulty inner

tube. For ordinary cheap, machine-made tubes are porous. They leak. They are made of but one thick sheet of rubber rolled on a tube and then vulcanized, which leaves all the tiny air pockets and bubbles and flaws especially inherent to cheap rubber in the tube. You can't see them, but they are there just the same.

And although you may start on a trip with tires properly inflated they *slow leak*. They leak *through* the rubber and around the valve base. They require inflating often else the shoes are quickly ruined.

National Special tubes are made of the finest selected rubber stock money can buy—Upriver Para. We could compound ordinary good rubber for $\frac{1}{2}$ the price we pay for this selected stock. Then when we build the tube we build it of many thin layers—not of one solid sheet. Each layer is rigorously inspected as it is applied in order that flaws, if any, may be detected and removed. Each layer is applied under ten tons of pressure. Then the tube is built *thick*—thicker than any other tube you have ever seen.

It takes time and money to make tubes in this way, but the results obtained are well worth the added cost, for these tubes are non-porous and are so guaranteed. They *stay* inflated. They are proof against deterioration. They have from three to five times the life of ordinary machine-made tubes.

Think This Over

Before you buy another cheap tube think of more than the initial price. Consider how long it will wear. Will it be a constant source of annoyance and endanger the life of your tires—the *real* item of expense? Will it lose its toughness and elasticity after being in use for only a short time? Will it stand heat—friction heat plus the heat of a hot summer day without going to pieces? Is it worth while—this saving of 50 cents on a tube at the expense of a good shoe?

Play safe. Get 100% tube value. Buy National "Special" Red Tubes.

National Rubber Company

Factory and Main Office,

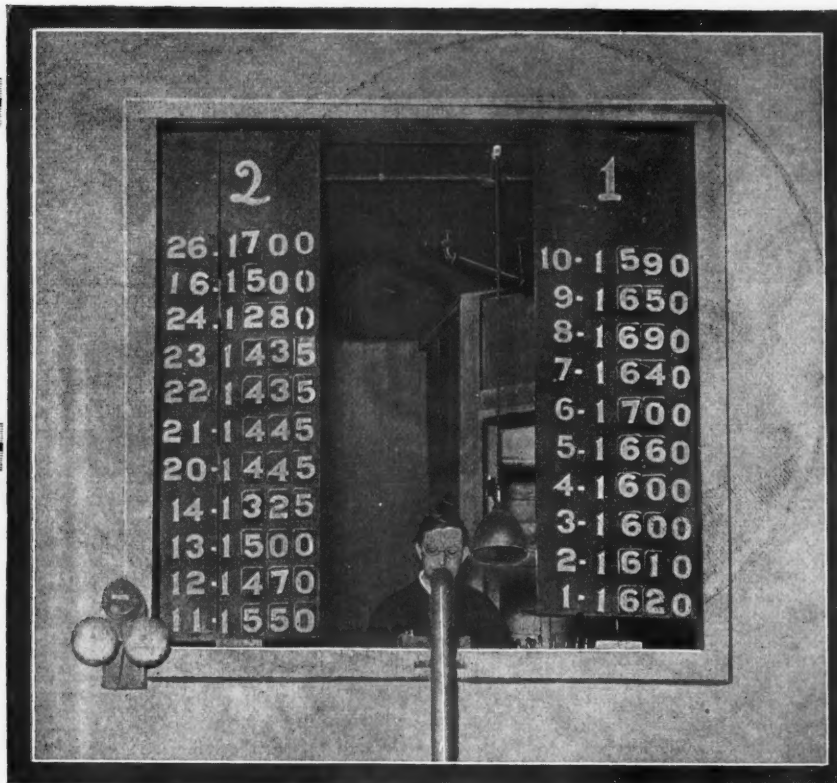
Pottstown Pa.

Size	Price	Size	Price
28x3	\$3.10	36x4	\$5.90
30x3	3.20	37x4	6.10
30x3½	4.10	34x4½	7.10
31x3½	4.25	35x4½	7.25
32x3½	4.40	36x4½	7.50
34x3½	4.70	37x4½	7.75
36x3½	5.00	35x5	8.50
31x4	5.20	36x5	8.70
32x4	5.30	37x5	9.00
33x4	5.50	39x5	9.50
34x4	5.65	37x5½	10.30
35x4	5.75	38x5½	10.50

National

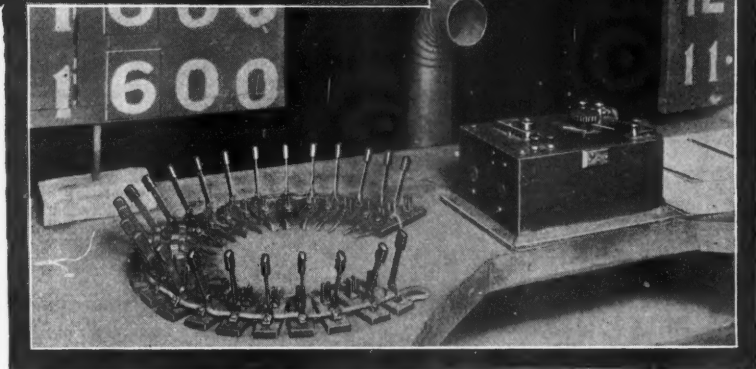
Special Red Tube

When Writing to Advertisers, Please Mention Motor Age



ANOT BROW

The illustration herewith shows the pyrometer recording room in the Brown-Lipe heat treating department. It shows the operator at the speaking tube and on either side the charts giving the readings of the various furnaces which are shown below on the opposite page in the lower cut. This operator makes five-minute checks of every furnace in the room, and it is his duty to see that the heat is brought from the low point to the high point regularly and steadily and that it is maintained at just exactly the right point during the specified time of the heat.



H EAT treating is the final determiner of gear efficiency. No matter how superior the raw stock of which a gear is made—no matter how carefully or how accurately the machining is done—no matter how perfect the design—if the heat treating or hardening be wrong the finished article is comparatively worthless.

For that reason the heat-treatment of Brown-Lipe products has been developed to a point probably unattained in any other manufacturing plant in the country.

Just one instance of the great care and watchfulness exercised in this department is indicated by the temperature chart on the opposite page.

To get the best results in heat treating it is necessary that the furnace be brought from the temperature to which it falls when the gears are put in to it up to a certain higher temperature within a certain limit of time and then held at this high temperature for another definite length of time. This raising of the heat from the low point to the high point must be done regularly and steadily in equal periods during this length of time.

By glancing at this chart shown on the opposite page you will notice just how carefully these furnaces are checked to bring about the necessary results. It will be seen that in this particular case the gears were placed in the furnace at five o'clock, at which time the temperature registered 1500 degrees. Then when the door was opened and the pots containing

BROWN-LIPE GEAR CO.
TRANSMISSIONS

BROWN

Syracuse, New York

NEW YORK: Thos. J. Wetzel, 29 W. 42d St.

CHICAGO: K. Franklin Peterson, 122 So. Michigan Ave.

DETROIT: L. D. Bolton, 2215

Exhibiting Section 16, Transportation Bldg., Panama-

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---in Official Mileage Test by The Automobile Club of America

This officially tested and certified service-average gives a definite assurance of actual mileage—as against the empty claims of mere theoretical superiority.

And the fact that this remarkable figure had been established **before** the 50% increase in wearing quality effected in our 1915 product brings forth more clearly than ever the unequaled value in

VACUUM CUP TIRES

—especially at the prevailing price schedule, the lowest for any tires having a non-skid device **added** to regular thickness of tread.

The most satisfactory seller from the dealer's and consumer's viewpoint alike. Guaranteed oilproof. Guaranteed non-skid on wet or greasy pavements, else returnable at full purchase price after reasonable trial.

Interesting new prices on Pennsylvania gray and pure gum red inner tubes—each bearing an unqualified guarantee.

PENNSYLVANIA RUBBER COMPANY, Jeannette, Pa.

Atlanta
Boston

Chicago
Cleveland

Dallas
Detroit

Kansas City, Mo.
Minneapolis

New York
Omaha

Philadelphia
Pittsburgh

St. Paul
San Francisco

Seattle

An Independent Company with an Independent Selling Policy

A Starter for Ford Cars

Genemotor
(Trade Mark)

The most powerful
of all Ford Starters

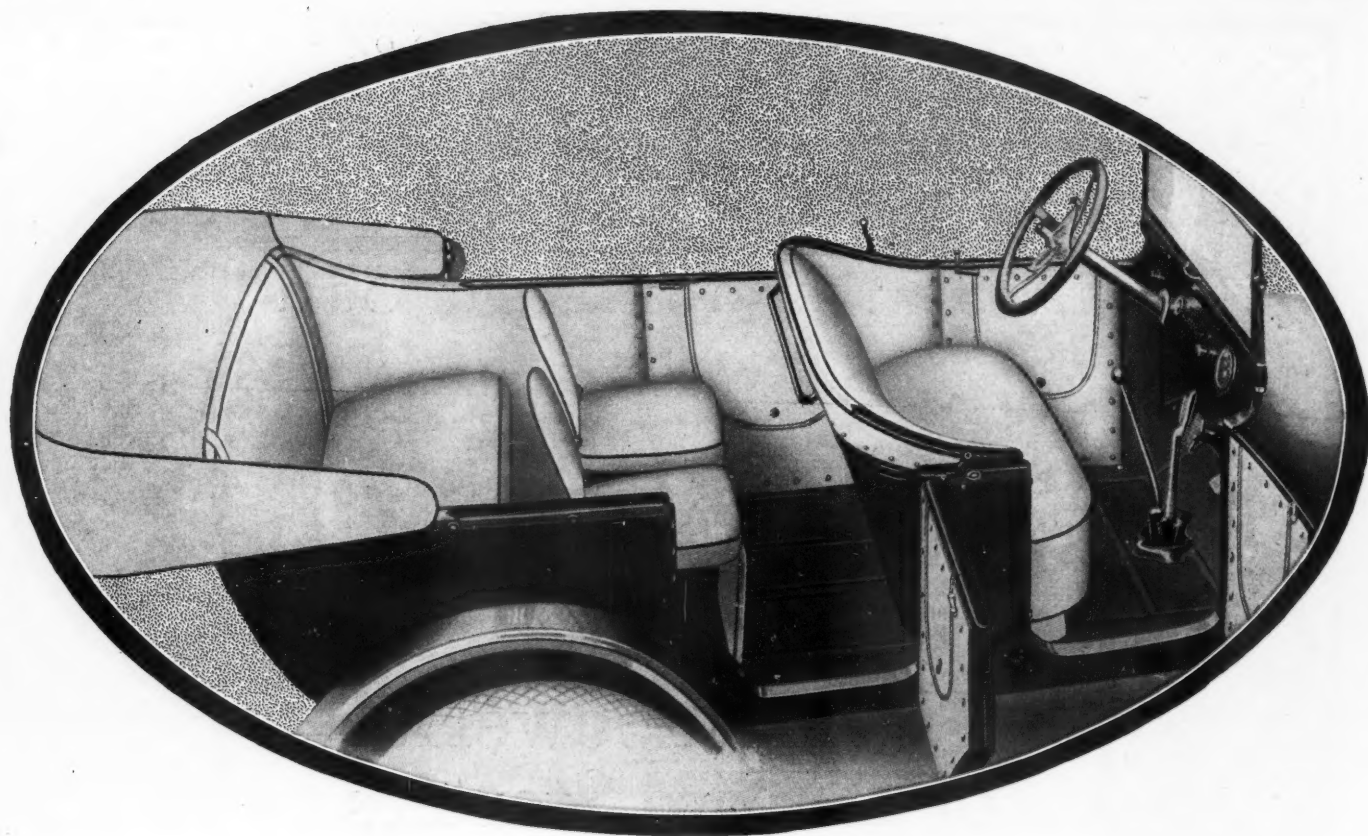
Built By

*The
General Electric
Company*

\$75 F. O. B.
LYNN,
MASS.

A. J. PICARD & COMPANY

Sole Distributors
1720-22 Broadway, New York,



Give Your Car This Luxurious Look

With every efficient mechanical accessory included as regular equipment on the car, the eyes of the automobile world are turned toward greater luxury.

Luxury—with all the added beauty, comfort and pride of ownership that go with it—is the aim of every motorist.

Campbell Detachable Upholstery gives you this luxury in a way no other single accessory can. It transforms the interior of your car into a drawing-room. It is the last word in refinement.

Campbell Detachable Upholstery goes on over your regular upholstery, and is held in place by special snap fastenings, so that it can be instantly removed for cleaning.

It can be obtained for all standard makes and models of cars in a wide range of fabrics and shades at surprisingly moderate prices. Every set is custom tailored to a permanent glove-fit. Its durability is greater than that of cheap leather coverings. See that you get it on your new car, or, better still, put it on your old car and make it look like new.

Write today for samples and prices

of Campbell Detachable Upholstery. Whether you are a manufacturer, a dealer or an owner, you owe it to yourself to investigate this accessory. Write today to

THE PERKINS CAMPBELL CO.

624 Broadway

New York Office, 89 Chambers St.

Cincinnati, Ohio



Write for this Catalog

Every dealer, every car owner should get a copy of our new catalog, describing and illustrating many other accessories, all sold under the Campbell guarantee. We have an especially attractive proposition for progressive dealers.



The name Campbell on the fastenings guarantees the genuineness of Campbell Detachable Upholstery. Look for it.

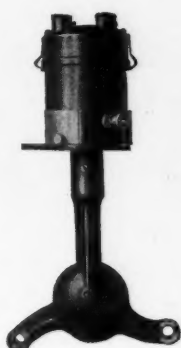
CAMPBELL GUARANTEED MOTOR CAR ACCESSORIES

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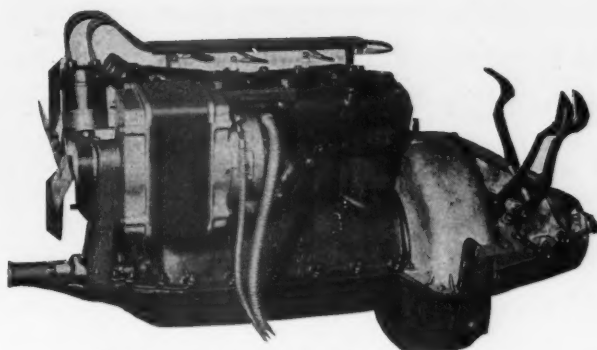
Westinghouse

Lighting—Starting—Ignition

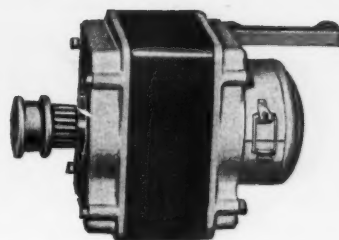
For Ford Cars



Ignition Unit & Bracket



Westinghouse Lighting-Starting-Ignition Installed



Motor Generator with Bracket

A Single-Wire System—A Twelve-Volt System
Single Silent Morse Chain—A Cut-Out to Prevent
Discharge of Battery.

Cranks over 175 r. p. m., charges battery
at 9 miles per hour—all wires armored.

The Lighting and Starting System is complete, consisting of Motor-Generator Unit, battery and box, switches, fuse box and fuses, chain and guard and sprockets, pulley and belt, metal armored wires with terminal attached, all wiring details and instructions, everything required for installation,

Price \$75.00, f. o. b. Pittsburgh, Pa.

The Ignition System is complete with Ignition Unit, including self-contained coil, mounting bracket, all wiring with terminals attached,

Price \$15.00, f. o. b. Pittsburgh, Pa.

The Lanterns consist of headlights with two lamps, and tail light—Westinghouse & McCandless lamps used.

Price \$7.50, f. o. b. Pittsburgh, Pa.

Write for Folder 4311, and our Agents' Proposition

Westinghouse Electric & Manufacturing Co.

Automobile
Equipment Department



Shadyside Works
Pittsburgh, Pennsylvania

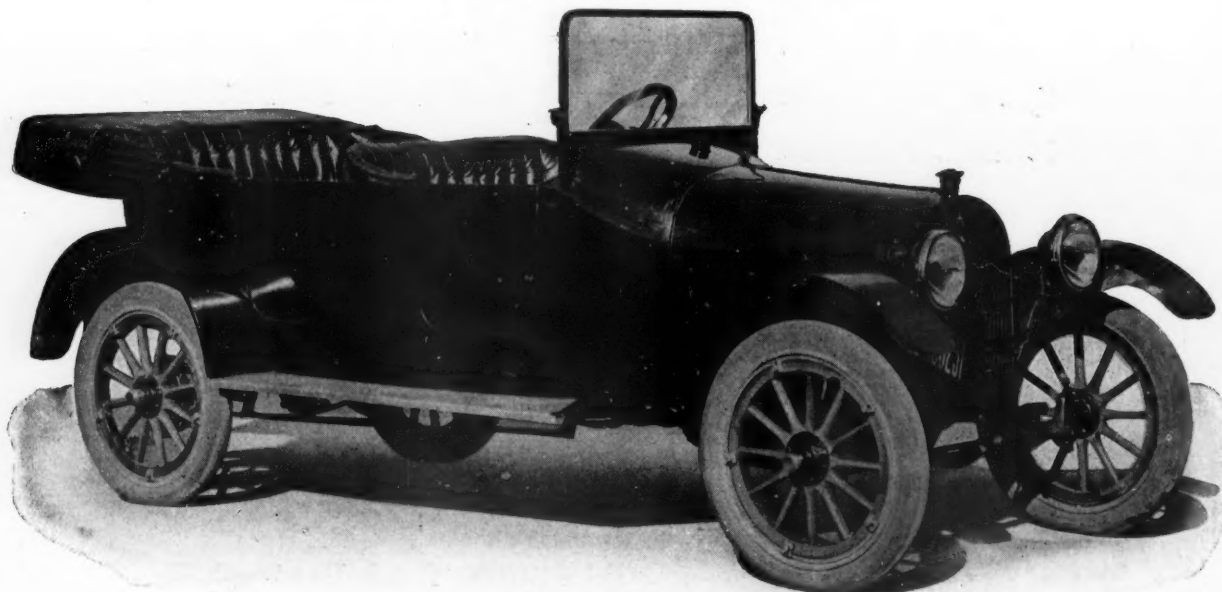
THE SPHINX



is a proved winner for the dealer who knows the possibilities of big business in handling a real automobile that sells for

\$695

completely equipped, ready for the road,
with electric lighting and starting system.

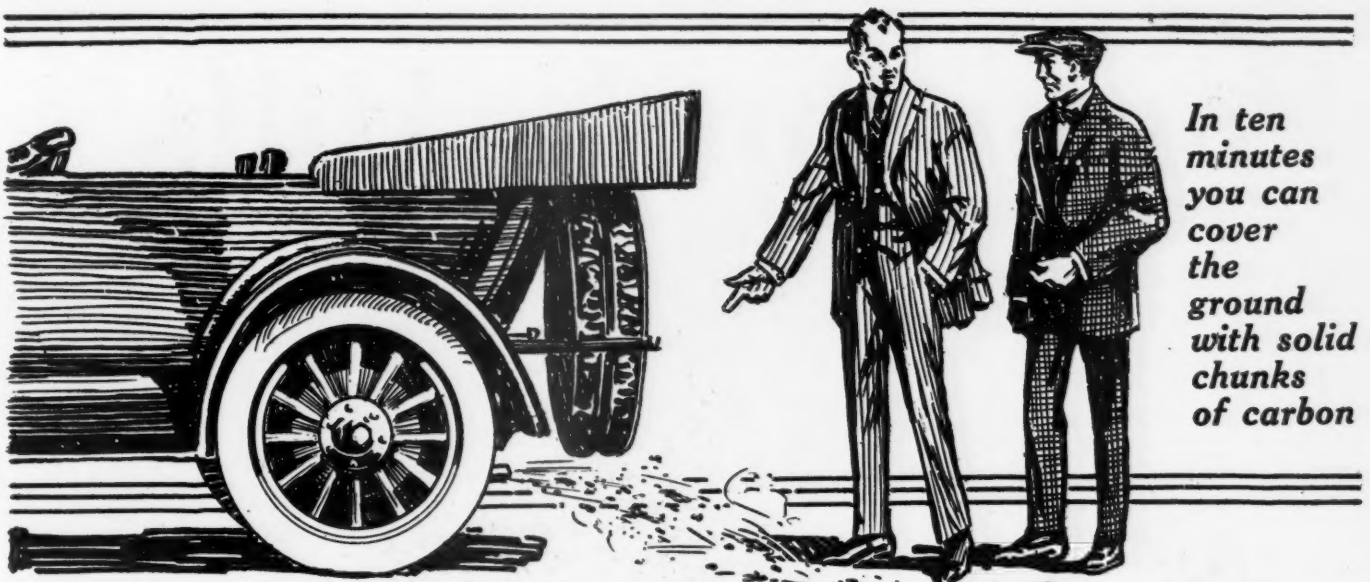


The motor is $3\frac{1}{4}$ -inch bore and 5-inch stroke.
The wheelbase is 112 inches.
The springs are cantilever, front and rear.
The width of the rear seat is 46 inches, and the depth 22 inches.

IMMEDIATE DELIVERIES

We guarantee you a car that is right, inside and out

THE SPHINX MOTOR CAR CO., YORK, PA.



In ten minutes you can cover the ground with solid chunks of carbon

Blow out the Carbon this way

OF all the agencies in the world for attacking and softening hardened carbon, including kerosene, alcohol and other oils, live steam has been found to be the greatest of all.

The Hart-Bell Carbon Remover is a simple little device which you can attach to your car in a few minutes and is so constructed that wherever you may be when starting your engine, at the garage or while it is standing idling at the curb somewhere, you may in 5 or 10 minutes make the insides of your cylinders as clean as the palm of your hand.



The Hart-Bell Carbon Remover has no mysterious or alleged influence. It is not one of those chemicals which are supposed to clean the cylinders and which may, at the same time, corrode away the iron. It is an absolutely safe and sure method which demonstrates its own efficiency immediately on any car by spitting out from the exhaust the solid chunks of carbon until the pavement is covered with particles.

Then you turn the cock back to neutral where it remains ready for immediate use when you feel that the cylinders again need attention.

Added to this, you have the additional advantage of being able to turn the three-way cock to another position, permitting a slight inflow of air or moisture in warm weather.

The Hart-Bell Carbon Remover does not admit water to the manifold. It injects atomized vapor so fine that in the cylinder it becomes superheated steam.

Would a device which absolutely eliminates carbon forever from your motor be worth the price of one cleaning, \$5?

Let us send you our enlightening booklet which is based upon the most advanced engineering practice.

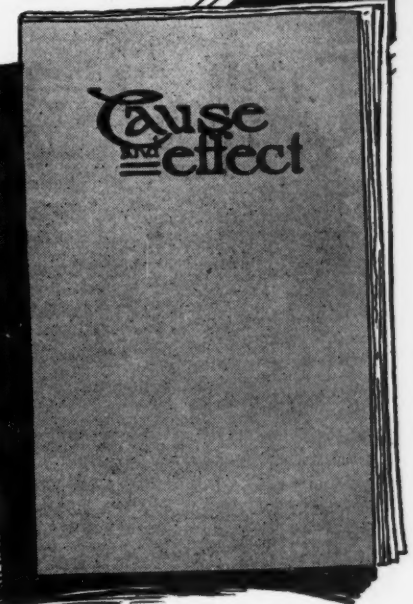


GUARANTEE

The Hart-Bell Carbon Remover Company, of New York, hereby guarantees that the Hart-Bell Carbon Remover will do all that is claimed for it, and if found unsatisfactory the full purchase price will be refunded upon return of same to agent from whom purchased.

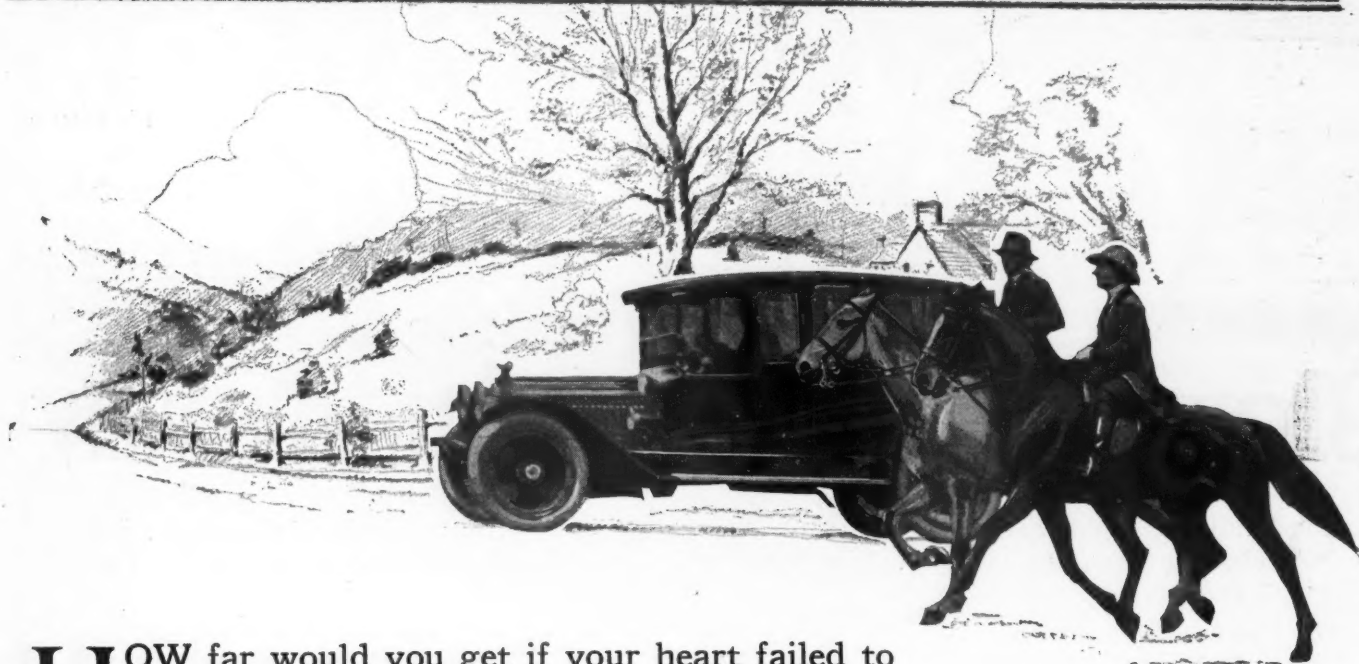
Utility Products Co., Inc.
1412 Times Bldg. NEW YORK

Write for this booklet



When Writing to Advertisers, Please Mention Motor Age

Power for the Hills



HOW far would you get if your heart failed to pump added vitality through your body when you undertake to do anything requiring extra effort—climbing a steep hill, for instance?

Just so with an automobile.

If the spark delivered by its ignition system does not furnish added vitality to its motor as the burden of hill climbing increases, then that kind of ignition is far from perfect and way short of the effectiveness of

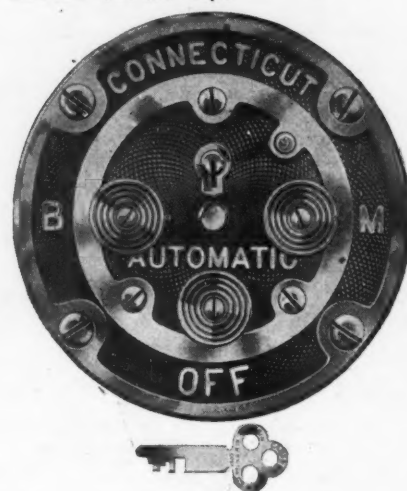
AUTOMATIC · IGNITION CONNECTICUT

In hill climbing—as well as for other conditions of driving—the fact that CONNECTICUT IGNITION automatically tempers the quality of its spark to agree exactly with the requirements of the motor—enables it to respond to the needs of the motor quite as naturally as the heart responds to the requirements of the body.

CONNECTICUT TELEPHONE & ELECTRIC **COMPANY, Inc.**
MERIDEN CONN.

Because of its Automatic Switch, **CONNECTICUT AUTOMATIC IGNITION** is able to provide a period of saturation sufficient even at the highest attainable speeds to insure a more powerful spark than the magneto's best effort.

With **CONNECTICUT AUTOMATIC IGNITION** the saturation period grows as motor speed decreases, so its spark gains intensity as the motor slows up.



When Writing to Advertisers, Please Mention Motor Age

DODGE BROTHERS MOTOR CAR

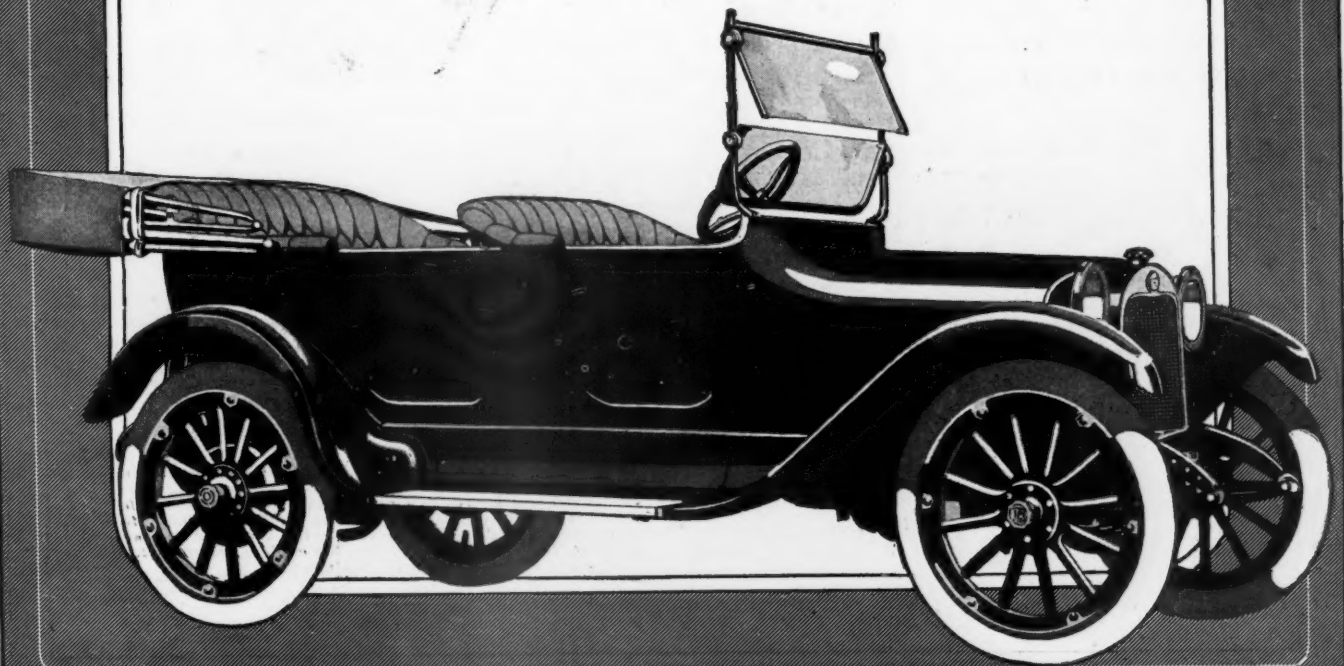
The motor seems like a thing of life, abounding in vitality—trigger-swift in the gliding get-away, and splendidly free from the slightest jerk, or jump, or jolt.

A reflection of this is the steadiness of the car—that freedom from trembling and vibration in the tonneau which means so much in ease and comfort.

The motor is 30-35 horsepower
The price of the car complete is \$785
(f. o. b. Detroit)

Canadian price \$1100 (add freight from Detroit)

DODGE BROTHERS, DETROIT



When Writing to Advertisers, Please Mention Motor Age.

EISEMANN

To permit, without the use of tools, the removal of the magneto simply by lifting it straight up—and to compensate for any deviation in the driving line of the driving and driven members of the magneto, the Eisemann flexible, adjustable Magneto coupling has just been placed on the market.

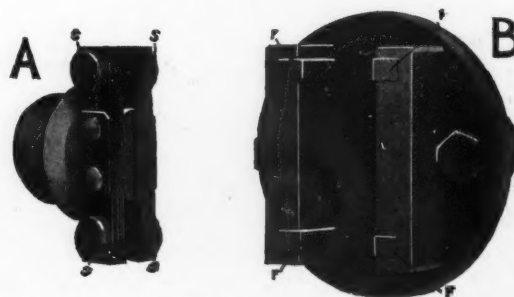
This coupling, which may be used with any standard magneto, is dust, dirt and practically wear proof. It admits of an adjustment to the timing over a range of 40 degrees (plus or minus 20 degrees) without dismounting either the magneto or the coupling. It also cushions the driving power.

The retail price of the Eisemann Magneto coupling is \$3.25. Ask your dealer or send to us direct.

The Eisemann Magneto Co.

Sales and General Offices
32-33d St., Brooklyn, N. Y.
New York Indianapolis, Ind. Detroit, Mich.
245 W. 55th St. 415-417 N. Capitol Ave. 802 Woodward Ave.

Eisemann Adjustable Magneto Coupling



The driving member A is attached to the Magneto driving shaft. Driven member B is attached to the magneto armature shaft. A is free to move within B to compensate for misalignment in one direction, while the flexible laminated steel springs in driving member A compensate for any misalignment in the other direction, the contact being between fiber plugs F and round metal buttons S.

DORT

The DORT Dual Exhaust

Four cylinder motors, equipped with dual exhausts, are rare.

They go beyond actual requirements for efficiency.

DORT is one of the few 4-cylinder dual exhaust equipped motors.

But the dual exhaust increases DORT power—DORT efficiency materially.

By exhausting cylinders 1 and 4, and 2 and 3 into separate chambers of the manifold, each section tends to scavenge the other, to prevent back pressure, and power-stealing friction.

The dual exhaust is simply one of the many points of DORT superiority.

Its use demonstrates that in decisions between quality and price—

DORT'S choice is quality.

\$680
Touring Car

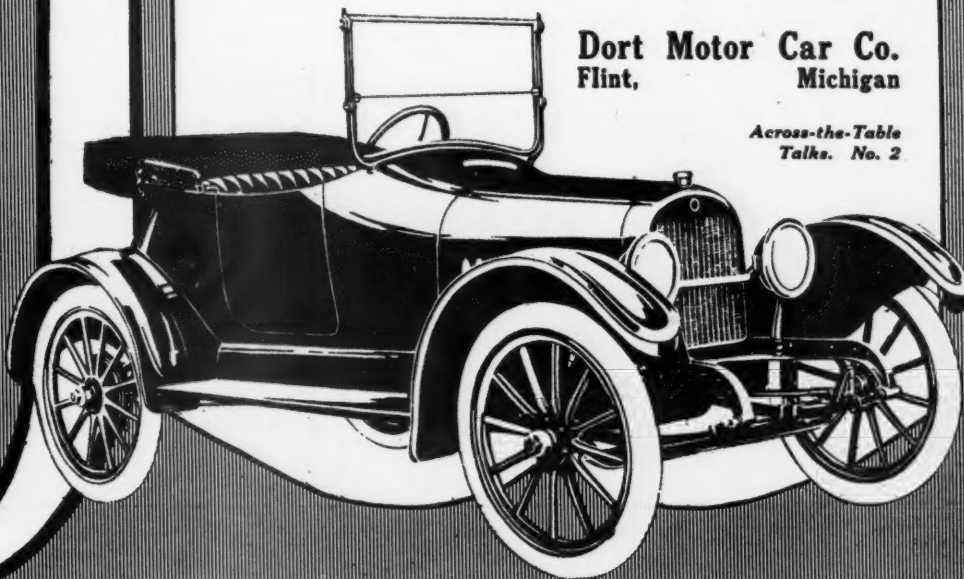


Runabout
\$495

Electric Starter,
Either Model,
\$45 Extra

Dort Motor Car Co.
Flint, Michigan

*Across-the-Table
Talks. No. 2*



LIVINGSTON PRODUCTS FOR FORD CARS

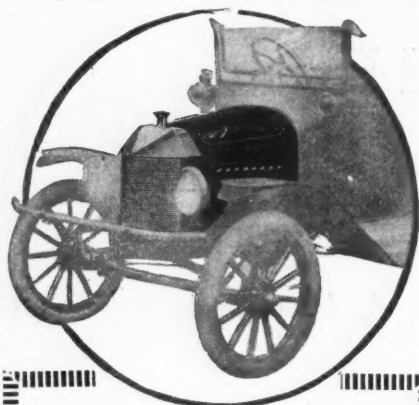
FORD OWNERS

Increase Efficiency—Improve Appearance

WITH

LIVINGSTON

Honeycomb Radiators and Sloping Hood



Front of Livingstonized Ford Car

In Death Valley, California, where the heat is almost unbearable—in India where the thermometer often registers 150 degrees—

Livingston Radiators Keep Ford Motors Cool

They are sold under a guarantee to give this kind of service. A Livingston Sloping Hood will give your Ford car that long streamline effect.

Insist upon the name Livingston
There is no "Just-as-Good"

Pointed Front Radiator . .	\$40.00
Straight Front Radiator . .	35.00
German Silver Finish, extra .	5.00
Streamline Hood	8.00

Ask your Ford dealer, hardware dealer or supply house, or write us for full details.

Livingston Radiator and Mfg. Co.
306 West 75th Street New York City

Saturday Eve. Post . . .	2,093,395
Literary Digest	346,417
Farm & Ranch	90,000
Nebraska Farmer	51,139
Iowa Homestead	140,000

Circulation 2,720,951
Readers, about . . . 13,604,755

Dealer Bulletin No. 1

We are taking it for granted that somewhere you have read about the construction of Livingston Radiators and Streamline Hoods in your favorite trade paper.

We are now going to talk to you about profits.

On the left hand side of this page we are reproducing an "AD" on Livingston products, which is being read by over thirteen million people this month.

Many of them own Ford cars.

Many of them will buy Livingston products this year.

Many of them are your customers.

These advertisements are in addition to our present big trade paper campaign.

Profits are made in turn-overs and not left-overs.

If you have not already investigated the Livingston line, don't you think it would pay you to do so now?

We are originators of the Pointed Front Radiators and Streamline Hoods for Ford cars.

Livingston Radiator & Mfg. Co.

306 W. 75th Street, New York, N. Y.

All types of Radiators built and repaired

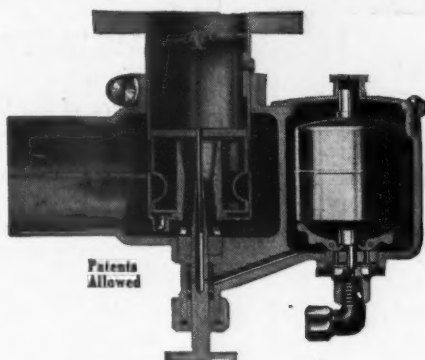
BUILT UP TO A STANDARD NOT DOWN TO A PRICE

Try It 30 Days Free

The best carburetor ever invented will be sent to Ford owners on 30 days free trial, backed by the most remarkable guarantee ever issued by a responsible firm. Try it on your car. Send it back at our expense if it fails to give you *5 extra horsepower—10 miles more speed—and carry you further and faster on 3 gallons of gasoline than you now travel on 5 gallons.*

New Ford Model

Brad-Kent



Carburetor

5 Extra Horsepower

The *Brad-Kent* will add 5 horsepower to the working power of your car. It will carry you up hills and through deep roads that you cannot make at the present time. It will start the

car more quickly and get you out of many a tight place. No matter what your present carburetor, we guarantee to beat it by at least 5 working horsepower.

10 Miles More Speed

No carburetor made can equal the *Brad-Kent* in quick get-away and average speed. We agree to give you at least 10 miles more speed than you

now have. And you can secure this extra speed—when you want it—on even less gasoline consumption than now.

Saves 2 Gallons Out of 5

The *Brad-Kent* Carburetor gives a better and more uniform mixture than others. Both air and gas are automatically regulated by the motor speed. Just one adjustment and one moving part aside from float. Lighter, simpler and easier of regulation than other good carburetors.

Replace your carburetor with a *Brad-Kent* and we guarantee to save you 2 gallons of gasoline out of every 5 gallons you now have to use.

In a recent official test conducted by Mr. F. E. Edwards, Official Observer for the Chicago Automobile Club—a Model "T" Ford Touring Car was driven at an average of *33.12 miles per gallon*. This record was made in a run of 102.01 miles between Chicago and Milwaukee on country roads.

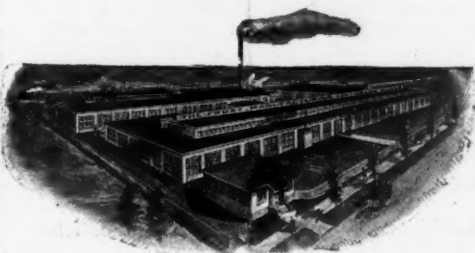
Can you get this mileage with your present carburetor? Then why not try a *Brad-Kent* for 30 days and see what it will do for you?

Shipped on 30 Days Free Trial

The complete Ford outfit includes a *Brad-Kent* Carburetor, manifold, hot air tube and stove. It fits any Model "T" Ford car and can be easily installed. Try it at our risk. \$15 at your dealer or direct if no dealer near you. We positively guarantee the extra power, the extra speed and the gaso-

line saving claimed in this advertisement. Mail the order blank and make us prove it to you.

Dealers: Write today for our attractive dealer proposition. The *Brad-Kent* sells to every Ford owner who tries it. We will help you sell them in your territory. Write for full particulars.



**The Frost
Mfg. Co.**

682 Fremont Ave.

**Kenosha
Wis.**

30-Day Approval Blank

The Frost Mfg. Co., 682 Fremont Ave., Kenosha, Wis.

Enclosed find Personal Check or Money Order for \$15.00, for which please ship me a *Brad-Kent* Carburetor and complete outfit for a Ford car. My repair dealer is

Ship to

Address

I understand that I may return these goods to you within 30 days, at your expense, and get my money back if I wish to do so. (4)



This, oft repeated,
is why.

The Manager of a Service Department, well known to Automobile men (name on request), recently saw a car brought in to be overhauled.

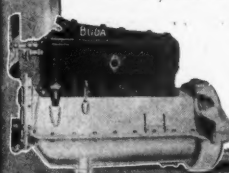
It had been driven 42,280 hard miles by a BUDA motor, and was three and a half years old. These miles included a trip from Atlantic to Pacific and return via Canada, California and Texas—some trip.



When the motor was "torn down," the manager, who knows all there is to know about *old motors*, was so impressed by the wonderful condition of this veteran BUDA that he *volunteered* a letter to us saying that even after this tremendous test all the motor needed was a new felt washer (worth five cents) and an adjustment of three *one-thousandths* of an inch in a crank-shaft bearing.

Any BUDA would do as well.

Isn't this the kind of Motor you want to put in your car or your truck?



BRANDENBURG & COMPANY
57th & Broadway, N. Y.
1112 S. Michigan Ave., Chicago
1311 Dime Bank Building, Detroit

THE BUDA COMPANY, HARVEY CHICAGO ILLINOIS.

50c Starting and Lighting 50c of Automobiles

A practical Treatise on
*Self Starters, Wiring
and Lighting and the
Storage Battery*

SUBJECTS TREATED IN THIS BOOK

Nature of the Gas Engine Cycle; starting conditions; various objections to starters; advantages. Classes of starters; **mechanical; compressed air; gas; and electric**, showing their construction and operation.

Electric Starters: One, two and three unit systems, showing component parts, complete and separate, choice of voltage, with typical diagrams for lighting and wiring. Some of the starters illustrated are U. S. L.—Delco—Leece-Neville—Jesco—Deaco—Adlake-Newbold—Electro—Autolite—Wagner—Esterline—Westinghouse—Gray and Davis—Ward Leonard—Rushmore.

Electricity—Simple and brief explanations—electrical units—ammeter, voltmeter, and wattmeter—electrical horse power.

Dynamos and Motors.—Working principles and construction clearly explained—description of the various parts—**answers relating to troubles:** improper connections; short circuits, etc., etc.—diagram illustrating the directions of current in the field winding and the induced magnetism.

Storage Batteries.—This section gives detailed explanation of the action of a storage cell; also information on Plante, Faure and Edison types of battery—all about the **electrolyte**, how prepared and maintained in proper condition—**charging**—charge indications—charging first time—precautions—rating of discharge capacity—taking battery out of commission—charging through night—**battery troubles in full**—mercury arc rectifier.

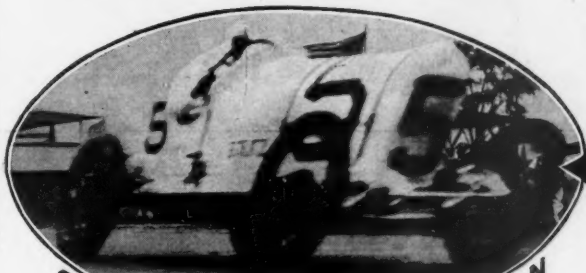
List of Full Page Plates—I. Road illumination by electric headlights; II. Delco starting system as applied to the Cole car. III. Remy starting system as applied to the Mitchell car; IV. Overland engine equipped with the U. S. L. starter, showing how to clean the commutator with a stick of wood; V. Wiring diagram of Westinghouse ignition and lighting system; VI. Leece-Neville two unit system; VII. Electric vaporizer and connections; VIII. Gray and Davis system as installed on the Lozier car; IX. Wiring diagram of electric system for starter, lights and horn as installed in the Lozier car; X. Phantom view of Gray and Davis system.

FOR SALE BY

Book Department

CLASS JOURNAL CO.
910 South Michigan Avenue Chicago, Ill.

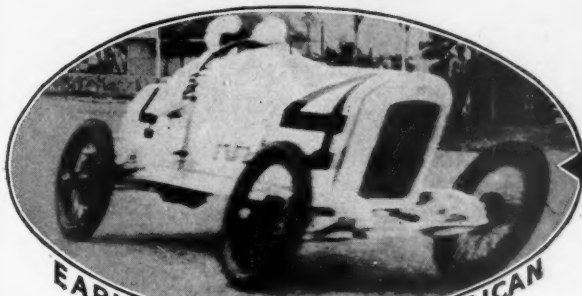
Champions



GIL ANDERSON, STUTZ AMERICAN
SPEED CHAMPION

SPEED *Wisconsin* CONSISTENT

Champion American Speedway Motor. First American car to finish at Indianapolis, Gil Anderson in Stutz — holder of American miles per hour record, 500 miles in 5 hours, 42 minutes, 28 seconds; average, 87.6 miles per hour. Earl Cooper, Stutz, second American car to finish, average, 86.19 miles per hour. Wilcox, Stutz, average, 79.66 miles per hour.



EARL COOPER, STUTZ AMERICAN
ROAD RACE CHAMPION

CONSISTENCY *Wisconsin* CONSISTENT

Champion American Road Race Motor. Wisconsin Motors have won for the Stutz more road races in the last four years than any other car has won in the last ten years.



BARNEY OLDFIELD, STUTZ LOS ANGELES-
PHOENIX DESERT RACE

ENDURANCE *Wisconsin* CONSISTENT

Champion Desert Race Motor. Barney Oldfield, Stutz, Los Angeles-Phoenix desert race, 696 miles in 23 hours. **Champion American Coast-to-Coast Motor.** E. G. Baker, in Stutz Bearcat, holder of transcontinental record, San Diego, Calif. to New York City, 3,728.4 miles, 11 days, 7 hours, 15 min., clipping 4 days, 2 hours, 45 min., from former record.



E. G. BAKER, STUTZ BEARCAT,
TRANSCONTINENTAL RECORD

ECONOMY *Wisconsin* CONSISTENT

Mr. Baker used 352 gallons of gasoline on transcontinental trip, averaging 10.6 miles per gallon. Motor $4\frac{1}{2} \times 5\frac{1}{2}$. Used $8\frac{1}{2}$ gallons oil, or 440 miles per gallon. Official A. C. A. test after run showed an average fuel consumption 0.65 lb. per B. H. P.

WISCONSIN MOTOR MFG. CO.
STA. A. DEPT. 311 MILWAUKEE, WIS.

When Writing to Advertisers, Please Mention Motor Age



Get the Jury

When the jury is on **your** side the opposition is up against a stone wall. Your case is **won**. To win your case with the purchasers of all products of the automobile industry you must insure successful distribution. The best insurance will be in absolute control of the jury, made up of engineers, factory managers, purchasing agents, and the army of **car-wise owners** whose favorable opinion every manufacturer is anxious to control.

Once every week this jury receives and reads The Automobile. Every week this body of tried men and true are given opportunity to consider and weigh the evidence—**your evidence**, Mr. Manufacturer.

More than 20,000 men who know how to interpret and carefully digest your message—more than 20,000 intelligent minds that constitute a tremendous influence in all purchase directions.

COURT IS IN SESSION. THE JURY IS WAITING

The Automobile will present your evidence—not only once, but 52 times during the next twelve months. And it will “get the jury.” Send for advertising rates.

**THE
AUTOMOBILE**
239 W. 39th St., New York

Gasoline Explosions Occur When Least Expected

A leaky can—or the can left open, permitting the gas to escape—a match struck in the dark, and there is trouble. It is dangerous to keep gasoline in an ordinary container. The insurance companies know it—you ought to know it. There is safety, security and protection in

McNUTT NON-EXPLOSIVE SAFETY CANS and DEVICES

Made of heavy steel and leakproof, every McNUTT Container is fitted with its McNUTT Safety Device which protects the contents of the can and its user from the dangers of fire and explosion that are always present with the ordinary type of can.

McNUTT Safety Devices and Containers have undergone the most rigid tests of Fire Inspection Bureaus, Safety Societies and Safety Engineers—The U. S. Navy department requires their use on storage tanks and cans in workshops

and on ships. The largest industrial companies are purchasing them for explosive and inflammable fluids.

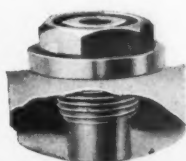
Made in a great variety of sizes and types suitable for garage, factory, home, motor boat and all other purposes.

A McNUTT Safety Can gives you an element of security that is worth many times its cost. It saves its cost in reduced evaporation of contents and durability.

AWARDED THE GOLD MEDAL BY THE
AMERICAN MUSEUM OF SAFETY DEVICES



Plug Close Garage Can



Safety Bung



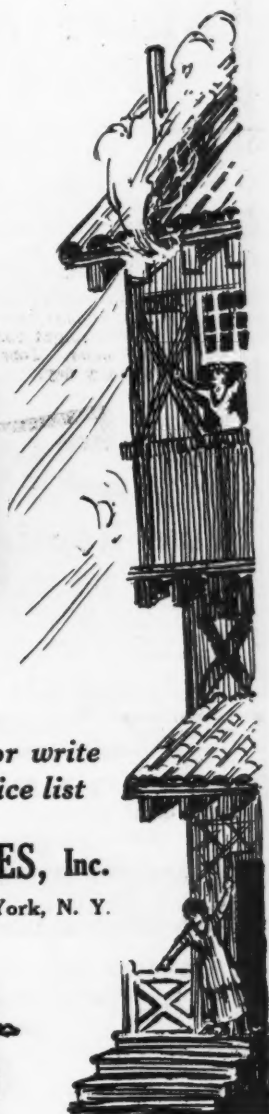
Eclipse Shop Can



Priming Can



Globe Can

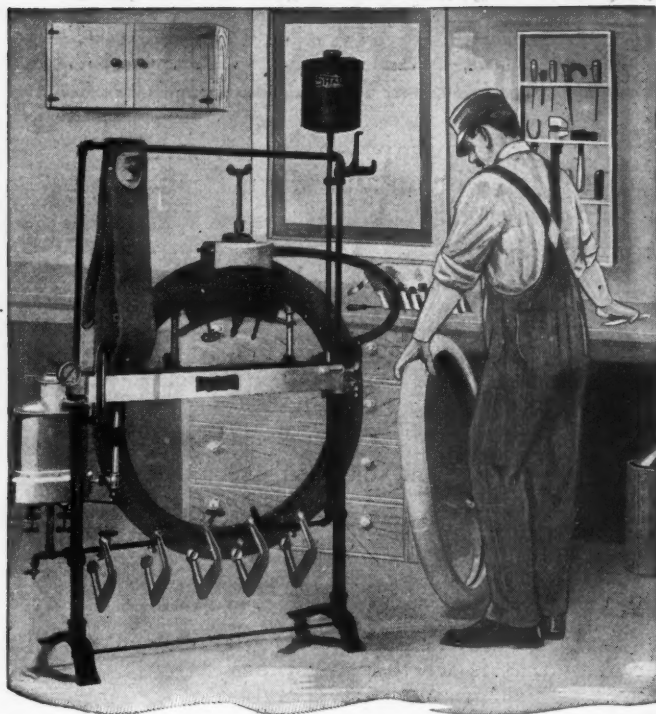


Ask your dealer or write
for catalog and price list

JOHN C. EAMES, Inc.

320 Broadway New York, N. Y.

When Writing to Advertisers, Please Mention Motor Age



Make \$60 a Week Repairing Tires

Don't be content to plod along on a small salary. Be independent. Go in the tire repairing business and make \$60 or more a week. One man made \$45 the first day he received his outfit. Others are making \$25 a day and hundreds of wide-awake men are making \$200 to \$500 a month clear profit above all expenses.

Be Your Own Boss

You can make big money in the Automobile Tire Repair business. No experience needed. We teach you how. Very little capital required. But slight risk as every car owner in your town is a possible customer. Jobs are plentiful because tires blow out and puncture every day.

SHALER

Tire Repair Outfit Only \$60

and will do as much and as perfect work as the big \$250 to \$500 vulcanizing outfits. A boy can vulcanize perfectly with this simple machine. It is the only vulcanizer that has Automatic Heat Control. It must vulcanize just right. It can't undercure or overcure a tire. Requires no watching or regulating. You can learn to do expert tire vulcanizing in half an hour with the Shaler.

Let Us Tell You How

to open an Automobile Tire Repair Shop and make more money. Send the coupon or a postal or a letter and get our Big Catalog and Free Book "Care and Repair of Tires." Write quick before some hustler gets ahead of you.

C. A. SHALER COMPANY

225 Fourth Street

Waupun, Wisconsin

Largest Manufacturers of Vulcanizers in the World.

Mail Coupon For FREE Book

C. A. SHALER CO., 225 Fourth Street, Waupun, Wis.

Without obligation to me send me Catalog and Free Book "Care and Repair of Tires."

Name.....

Street.....

City..... State.....

When Writing to Advertisers, Please Mention Motor Age



Ask Any Chauffeur

Which is the best pump. They know from experience. The man who leaves the selection of a tire pump to his chauffeur will find that he will get a bill for a



There is a double moral to this. If the owner investigates he will find, invariably, that the chauffeur selected a Bridgeport Pump because it does the work quicker and with less effort than any other on the market.

The demand for Bridgeport Pumps has put our production on a tonnage basis.

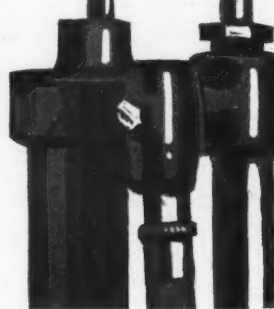
Bridgeport Pumps are one of the outstanding examples of quality and quantity combined.

We are the world's largest producers of Automobile Tire Pumps

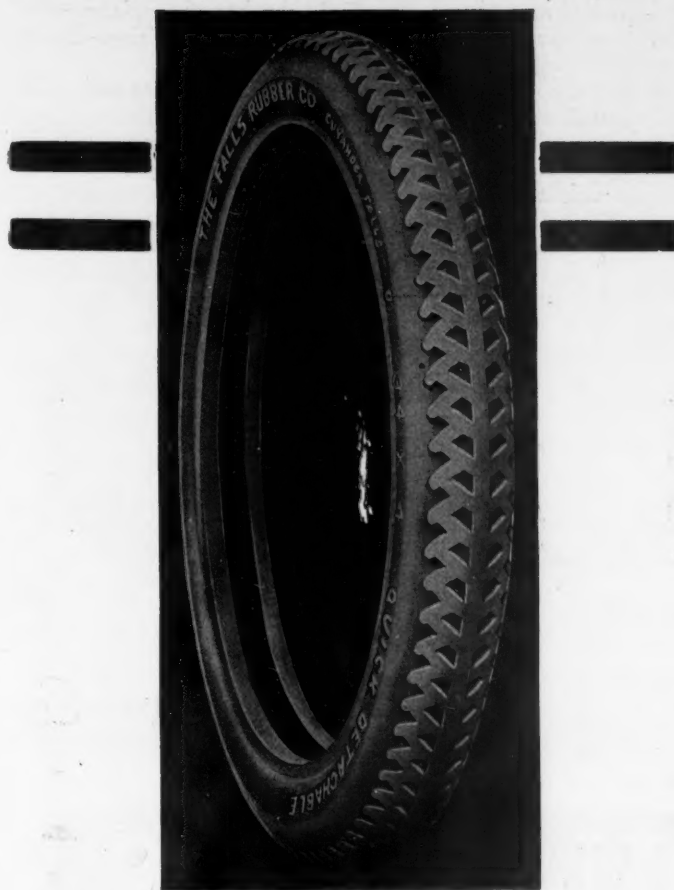
We guarantee to give a better pump for less money than any other manufacturer.

Bridgeport
Brass
Company

Bridgeport,
Conn.



FALLS TIRES



Falls Tires are building permanent, money-making businesses for dealers, everywhere. Our quality tire and co-operation which we give the dealer make our proposition unequaled.

Guaranteed 5000 Miles

The Falls Rubber Company, Cuyahoga Falls, Ohio

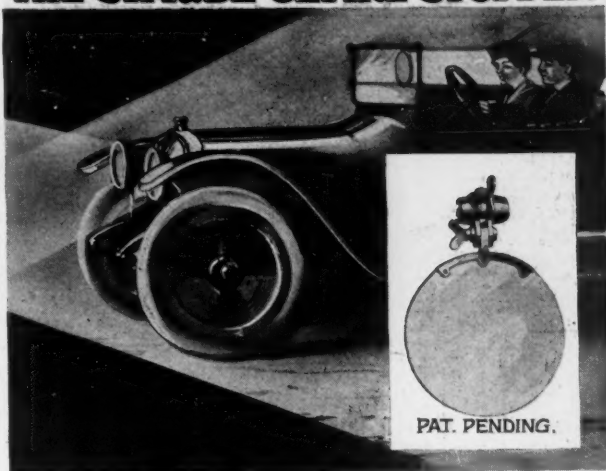
BRANCHES AND AGENCIES

The Falls Rubber Co. 2001 Euclid Ave., Cleveland, Ohio
 The Service Tire Co. 2307 Indiana Ave., Chicago Ill.
 The Denver Rubber Co. 516 16th St., Denver, Colo.
 The Myers-Hoffman Tire Co. 1520 Jefferson Ave., E., Detroit
 Naegle & Lamb Co. 1204 Hennepin Ave., Minneapolis, Minn.
 Falls Tire Co. of New Jersey 64 Halsey St., Newark, N. J.
 Royal Tire Co. of New York 833 7th Ave., New York, N. Y.
 The Falls Tire Co. 633 N. Broad St., Philadelphia, Pa.
 Costello-Lang Co. 556 Golden Gate Ave., San Francisco, Cal.
 Seattle Tire & Rubber Co. 1624 Broadway, Seattle, Wash.
 McAdams & McCrery Urbana, Ohio



When Writing to Advertisers, Please Mention Motor Age

THE STAUDE GLARE STOPPER.



The Staude Way

When the motorist is protected by and looking through a Staude Glare Stopper the blinding lights of the approaching automobile are modified to a soft glow. The entire road can be seen with perfect ease, and there is no danger of accidents resulting from driving ahead with one's eyes blinded.

We have solved the Glare Problem at the right end without decreasing the light necessary for safe driving.

The beautiful, rich, amber colored glass looks fine and lends tone to any car.

The Staude Glare Stopper is guaranteed to protect the eyes of the automobile driver from the strongest approaching light in night driving or sun dazzle during the day.

If it does not do this, return the Glare Stopper and your money will be refunded.

The Staude Glare Stopper

The nickel plated clamp will fit on the windshield of any make of car. The heavy clear amber-colored crystal lens glass, 6 3/4 inches in diameter, dissects the light rays and makes driving at night a constant pleasure instead of a constant fear.

Retail Price

\$2⁵⁰

Parcel Post C. O. D. or at all first-class dealers

To Dealers: The STAUDE GLARE STOPPER is one of the fastest selling automobile accessories on the market today.

The STAUDE GLARE STOPPER is not a cheaply made and "tinnie" looking affair. It is made of the best polished crystal amber glass—and you know ground and polished glass is always clear and can never fade or curl like celluloid.

E. G. Staude Manufacturing Co.
 2675 University Ave., St. Paul, Minn.

Dear Sirs:

Please send me by Parcel Post C. O. D. \$2.50 prepaid one complete

STAUDE GLARE STOPPER

with the understanding that I may return it if unsatisfactory and get my money back.

Name

Address

City State.....

To The Manor Born

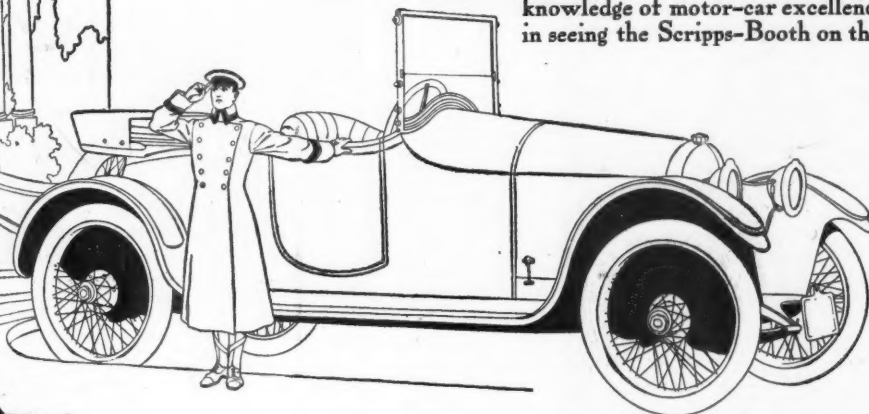


WITH all dignity and road authority, with all beauty and silence of operation, with all the caprices of appointment of the exclusive and expensive large cars, the Scripps-Booth has its unquestioned place in the aristocracy of motordom.


For the first time a light car has been admitted as the social and mechanical equal of the world's largest and highest priced cars.

Owners of these large cars are the ones who are especially appreciative of Scripps-Booth design as giving them their first opportunity to secure in light weight what they have always had in large cars.

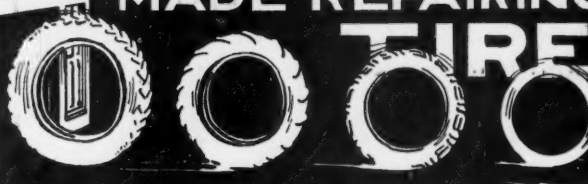
Every motorist of consequence and every man based in knowledge of motor-car excellence will be interested in seeing the Scripps-Booth on the nearest salesfloor.



*Scripps-Booth Co.
Detroit, Mich.*



THOUSANDS OF DOLLARS MADE REPAIRING TIRES



The amount you can make in dollars repairing tires is measured by your own energy. You can make anywhere from \$1500 to \$3000 a year above expenses. Your investment to start in business is small, returns are quick and your income cash. Profits are large on every job you turn out. The tire repair business is in its infancy. It's growing every year, because more tires are being used every year. In almost every city and town there is a crying need for a good tire repair man. That means opportunity for you. Start in your home town if you want to. This is a new money making business. Don't delay getting busy. But above all be prepared with an equipment that means satisfactory work for your customers. Buy only an

AKRON-WILLIAMS TIRE REPAIR EQUIPMENT

The better your equipment, the better your work and the greater your volume of business. Let us start you in business right. Use an equipment which is

ENDORSED BY 30 LEADING TIRE MANUFACTURERS

It takes you but a short time to become an expert tire repair man. We help you here. We are making an unusual offer to everybody who buys our equipment. You can become an expert by our plan.

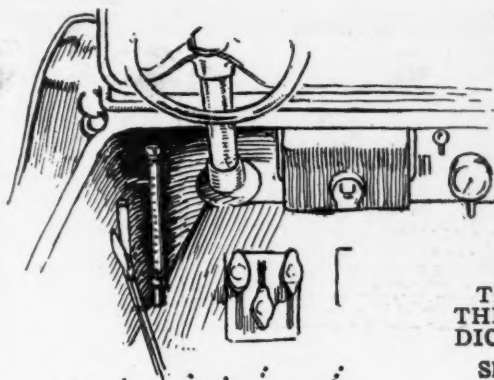
SEND FOR OUR 30 DAY SCHOOL PLAN

It means when you start in business, you start right. You are prepared to make money from the jump. No experimenting. No failures. You become a practical, first class repair man.

WRITE FOR CATALOGUE NO. 200.

WILLIAMS FOUNDRY & MACHINE COMPANY ASH & CANAL STS
AKRON, OHIO
WATERHOUSE & LESTER COMPANY, Exclusive California Distributors, San Francisco, Los Angeles.





The FOXY GAS GAUGE

THE GREATEST CONVENIENCE EVER OFFERED
THE FORD OWNER—HANDSOMEST GASOLINE IN-
DICATOR EVER DEvised.

Shows exactly the amount of gasoline purchased.
No need of disturbing passengers, lifting cushions or en-
dangering your life to ascertain the amount of gasoline in
the tank.

May be applied to any Ford Car with tank located under
seat.

The Foxy Dash Gasoline Gauge is made of heavy brass
as durable as your Car, completely nickeled; may be in-
stalled in a few minutes without the use of any special
tools. Price includes all necessary connections.

When ordering state Cowl or Straight dash board.

The dealers who are handling this attractive device find it
to be one of the easiest selling Ford accessories.

If unsatisfactory return to us in ten days and we will refund
money.

Mr. Dealer: If you have not as yet offered to your Ford
customers this Gauge, let us hear from you at once. We will
be pleased to tell you all about this useful article and discuss
territory.

Fox Accessories Co., Inc., Distributors

47-51 Raymond Street

Brooklyn, N. Y.

Manufactured by Fox Gauge & Specialty Co., Brooklyn, N. Y.

**\$3.50
complete**



You don't throw this away

It's just as unnecessary—just as extravagant
—to throw away your tires when they be-
come tread worn or rut worn as it is to
throw away your shoes when the first sole
gets thin.

You can get from 5,000 to 10,000 miles more service out of
them by doing as European motorists have been doing the
past three years—"half-soleing" them with Steel Studded
Treads—and saving \$50.00 to \$200.00 a year in tire expense.

**5,000 miles GUARANTEED
without a puncture**

No matter whether your tires are old or new, tread worn or
rut worn. Think of the delight of motoring without the con-
tinual worry of tire trouble—to say nothing of the money saved.

We Ship on Approval—without a cent deposit—prepay the ex-
press and allow you to be the judge. Durable Treads are easily
applied in your own garage in 30 minutes.

Special Discount Offered to motorists in new territory on first
shipment direct from factory. Simply fill out and mail the
coupon today and we'll send you full information, sample and
copy of our 5000 mile guarantee.

*20,000 American Motorists have equipped
with Durable Treads in the last 9 months*

COLORADO TIRE & LEATHER CO.

635 TREAD BLDG., DENVER, COLO.

Dept. F35, Box 228.....CHICAGO, ILLINOIS
Suite 356, 162 W. 34th Street.....NEW YORK



MAIL THIS TODAY

Colorado Tire & Leather Co., 635
Tread Bldg., Denver, Colo. Dept.
F35, Box 228, Chicago, Ill. Suite
356, 162 W. 34th St., New York.

Gentlemen: Please send me full
information, sample and copy of
guarantee, without any obligation
to me.

Name

Address

My Tire Sizes Are.....

Every Driver in the



500 MILE SWEEPSTAKES VANDERBILT CUP RACE GRAND PRIZE RACE



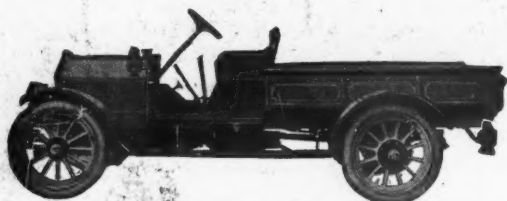
used the Bosch Magneto—not only because Bosch Ignition is more speedy, not only because Bosch Ignition is more capable, but mainly because Bosch Magneto Ignition is Absolutely Reliable—proved by the fact that not one driver in any of these races experienced a moment's trouble with his magneto—ignition was fast, efficient and ever evident.

**If you want Reliable Ignition
Be Satisfied—Specify Bosch**

There's a Bosch Magneto for your car—write us about it.

BOSCH MAGNETO CO., 214 West 46th St., New York

Service and Distribution Stations in Every State



Model A-3, 1500-lb. Truck, Complete with Express or Stake Body, \$1200. Chassis only, \$1125

"The MENOMINEE" TRUCKS FOR ECONOMY

After continuous service for hours, all your drivers need do is run your MENOMINEE Trucks into the garage—and leave them.

No rubbing down.
No stall to clean.
No harness to put away.
No supper to prepare.
No bed to make.
No "day off" tomorrow because of over work today.

Unless your horses will work 24 hours a day, 365 days a year—you need MENOMINEES.

See the 3 models—1,500 lbs., 1 ton, 1½ ton; \$1,125, \$1,400, \$1,800—pick yours—and use them for better and cheaper service.

Big Business for Dealers

WRITE

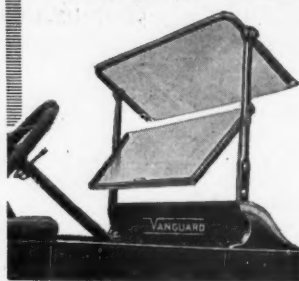


D. F. POYER CO.

Menominee, Michigan



Keep Cool and Dry in Your Ford Behind a **VANGUARD** Windshield



VANGUARD

**"Ford De Luxe"
Wind Shield**

(Patented, Dec. 29, 1914)

—Is made 42" wide for 1913 Ford cars, and 40" for 1914 models, and all 1915 models that come equipped with zig-zag windshields. Complete with adjustable attachments. **\$15**

"Adjustable" Wind Shield

Makes new stream line Ford comfortable at all times. Directions for detaching old wind shield, and attaching VANGUARD, furnished. Price.....\$10



DEALERS—Ford owners want class and comfort. They get both with VANGUARD, at moderate price. Big sales. Write for liberal discounts.

VANGUARD MANUFACTURING CO.
DETROIT, MICHIGAN

ZENITH FORD CARBURETOR

Gives Extra Power

FREE The strongest selling argument for the Zenith Ford Carburetor. "A perfect mixture at all speeds with absolute automatic certainty." "Rapid pick-up with smooth, easy 'get away' without racing engine."

A Zenith demonstrated is a Zenith sold. Once installed, the ZENITH is always right. Not a screw, spring, valve or clapper to adjust. The compound spray nozzle gives an automatic priming charge, and then adapts itself to every possible condition at every impulse of the engine, without further attention. **NOTHING LIKE IT!**

Retails at \$20.00, with a generous profit to you. Write for proof of claims, trade terms and selling helps.

THE MOTOR PARTS COMPANY

Sole Producers

818 No. Broad Street, Philadelphia

MAKE \$250⁰⁰ A MONTH REPAIRING AUTOMOBILE TIRES

Sounds like a lot of money—IT IS—A WHOLE LOT of MONEY to be earning CLEAR every month—yet it's what hundreds of men we have established in the Automobile Tire Repair Business are making. You let down the DRAW BRIDGE for SUCCESS to enter into your career by getting into business for yourself. The business for you is the one where investment is small—the returns quick and for cash—where the margin of profit is large—the demand for your PRODUCT or SERVICE constant and ever on the increase.

A Haywood Tire Repair Equipment

answers to all of these requirements of Old Dame Fortune—the certainty of success in this business is as sure as anything in this world can be—Each year adds thousands of new Automobile Owners—they need YOU to keep their tires in service.

Here Is Your Opportunity!

Be first to enter this new, big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnston, Tex., writes: "I have made as high as \$18 in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3000.00. That's going some! Operate a plant as a side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

HAYWOOD TIRE & EQUIPMENT COMPANY 720 N. Capitol Ave. The New Money-Making
INDIANAPOLIS, IND. Business—Start Now

Repair Tires At Home

Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business. Auto owners—repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow, investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.





There are two kinds of comfort—body and mind—you get both with



Road Smoothers

REG. U.S. PAT. OFF.
Quickly applied to your Ford Car

\$15 Set of Four
One for Each Wheel

They give you the body comfort that comes from motoring "relaxed" in a smooth riding car—regardless of the road's roughness.

They give you mind comfort—that freedom from the tiring effort of steering around bumps and ruts so common to the average road.

K-W Road Smoothers give you this enviable comfort because their design combines these three vital factors; a spring to effectively take up the shock; an anti-rebound air chamber to check the rebound; anti-side-motion links to prevent side-rocking and swaying.

Sold by reliable dealers everywhere. Write for booklet, "That Satisfied Feeling."



2835 CHESTER AVE. CLEVELAND, OHIO, U.S.A.
Manufacturers of the 125,000 K-W Master Vibrators

\$6 and Up

**Warns Both
Ear and
Eye**

The TRINITY BELL

"Authoritative As a Policeman's Whistle"



Commands the Road

Everybody steps out of the way for the TRINITY BELL—the recognized signal for safety.

Fire trucks, ambulances, service wagons, street cars, make the bell the respected warning signal.

TRINITY BELL combines the bell warning and ruby light—world accepted danger signal.

It is the most efficient warning signal for your automobile. Loud, clear, effective.

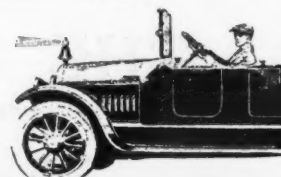
In accordance with the law. Easily operated by electric push button. Three models—\$6 to \$12.

At your dealers or direct on receipt of price.

Dealers and Jobbers Wanted

TRINITY BELL
ELECTRIC MFG. CO.

5108 Calumet Ave. Chicago
Branch Offices: Trinity Bell Sales Co. 2028 Farnam St., Omaha, Neb.
1110 E. 15th St., Kansas City, Mo.
519 Downing Bldg., Erie, Pa.
Dunlap Auto Supply Co., Dallas, Tex.



"WHITNEY" CHAINS

The Most Practical for Motor Trucks



Made by specialists

in one of the most modern
fireproof
factories in the
country.

THE WHITNEY MFG. CO.
HARTFORD, CONN.

Chains Keys Hand Milling Machine

DIXIE 20TH CENTURY MAGNETO

Wonderful simplicity of construction and accessibility of parts are striking features of this high-tension magneto, which penetrates its charge with a full spark at the lowest as well as the highest motor speeds.



SPLITDORF
Electrical Co.
NEWARK, N. J.

(All SPLITDORF features are fully covered by patent or patents pending)

MERCER

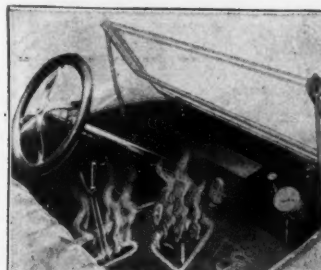
The Mercer is the only high grade American car built in "fours" exclusively.

Literature Mailed on Request.

Mercer Automobile Co.

800 Whitehead Road
Trenton, N. J.

22-70
Sporting
Four-
Passenger



Without
CAR-COOL

Hotter than the Grates of HADES!

Why continue to broil your feet and legs? Hot, uncomfortable feet make you hot and uncomfortable all over.

Hot weather is bad enough without having to put up with intense motor heat streaming up through the brake and pedal slots in your floorboards.

Keep cool and comfortable by installing—

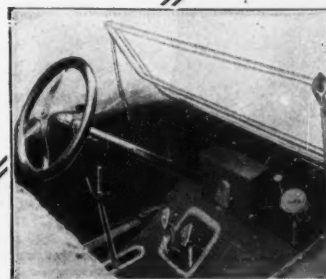
CAR-COOL For Fords

CAR COOL absolutely prevents the entrance of motor heat to the front compartment of the car. CAR COOL is composed of non-heat conducting materials. It is easily attached to the bottom of the floorboards, insulating them against motor heat and serving to close automatically both brake and pedal slots irrespective of position of levers.

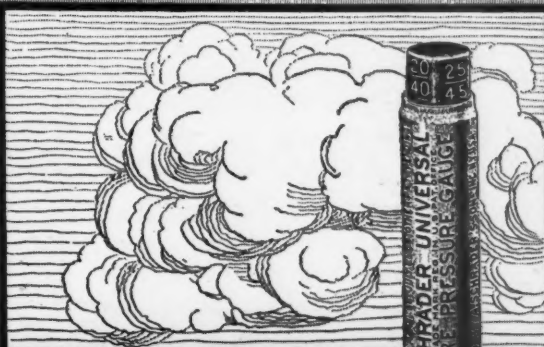
Each section of CAR COOL marked where it belongs. No fitting necessary. Anyone can attach in 20 minutes. Does not interfere with running your car or removing the floorboards. Order direct, or through your dealer. Dealers wanted everywhere.

\$3 Complete

Car Cool Co.
37 W. Van Buren St.,
CHICAGO



With CAR-COOL



Schrader

A TIRE begins to overwork and overwear the minute the air pressure in it falls short of the inflation prescribed for it by its makers. There is no method yet discovered of ascertaining the pressure in the inside of a tire except by the use of a pressure gauge. A casing containing 40 lbs. of air looks and feels exactly like a casing containing 80 lbs. If your tires require 80 lbs. and you only give them 40, they're on the quick road to the scrap heap.

USE A

SCHRADER
UNIVERSAL TIRE PRESSURE GAUGE

and save your tires

PRICE **\$1.00**

For sale by Tire Manufacturers, Jobbers, Dealers, Garages, or
A. SCHRADER'S SON, Inc.
783-791 Atlantic Ave. Brooklyn, N. Y.



Big Profits Made Grinding Cylinders!

Garagemen—Repairmen: Make scored cylinders of the cars you overhaul good as new. True up the cylinders if they are worn and thus increase motor power. Make good profits and satisfied customers. Hundreds of others doing big business.

ACME CYLINDER GRINDER

Quickly Pays for Itself

Can be attached to any lathe. ACME has same advantages as large cylinder grinding machines costing \$1300 to \$2000. The price of the ACME is within reach of every progressive garage and repairman. Guaranteed for 1 year.

ACME does not require the cylinder to be rotated. Grinds 4's, 6's, 8's, 12's just as easily as single cylinders.

Are You Getting the Profitable Cylinder Grinding Business in Your Town?

Constructed of best materials. Anyone can operate it. Easily adjusted.

FREE BOOKLET

Write for it. Contains full details. You want to make more money. Here's the way.

The Acme Grinder Company
Minneapolis, Minnesota

THE MIDGLEY

The MIDGLEY**Patented Wire Tread Tire**

Midgley Tires give you exactly what your trade demands—the extreme high limit of quality at a low cost per mile of service. They are sold under a 6,000-mile adjustment, and remain non-skid to the very last mile. They are practically proof against puncture and blow-out. These are facts, thoroughly demonstrated and vouched for. Write for terms, and for Booklet No. 11.

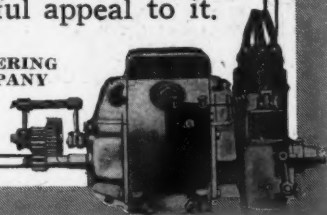
Midgley Non-Skid, Plain Tread and Inner Tubes Manufactured Only by

The Midgley Tire & Rubber Co.
Lancaster, Ohio

DELCO**ELECTRIC LIGHTING CRANKING IGNITION**

The man who sells a Delco equipped car has a talking point with a wonderful appeal to it.

**THE DAYTON ENGINEERING
LABORATORIES COMPANY**
Dayton, Ohio



Barring the unforeseen, each retail buyer of a new Ford car between August, 1914, and August, 1915, will receive from \$40 to \$80 as a share of the Ford Motor Company's profits.

Readily adaptable to all situations, the Ford is the car for your tours and camping expeditions, as well as being a general utility in the demands of everyday life, averaging about two cents per mile to operate and maintain.

Touring Car, \$490; Runabout, \$440; Town Car, \$690; Coupelet, \$750; Sedan, \$975; f. o. b. Detroit with all equipment.

Ford Motor Company
Detroit, Mich.

HOLLIER

1915 EIGHT 1915
It leads the leaders
THE LEWIS SPRING & AXLE CO.
JACKSON, MICHIGAN

Raybestos

TRADE MARK

REG. U.S. PAT. OFF.

THE PRODUCT OF BRAKE SPECIALISTS

USED FOR

BRAKE LINING - CLUTCH FACING

Manufactured by

THE ROYAL EQUIPMENT COMPANY

Bridgeport Conn.

**Hyatt Quiet Bearings****HYATT SERVICE STATIONS**

Atlanta, Ga. Los Angeles, Cal.
Boston, Mass. New York,
Chicago, Ill. (Harrison, N. J.)
Detroit, Mich. Minneapolis, Minn.

SERVICE AGENTS

High Wycombe, England
Broom & Wade

Hyatt Quiet Bearings are used in the majority of American made Automobiles

HYATT ROLLER BEARING CO.
DETROIT, CHICAGO
NEWARK, N.J.

**Guaranteed for 10,000 Miles
Bricton Pneumatic Tires**

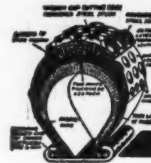
We now sell Bricton Pneumatic Tires on a specific guarantee of 10,000 miles service. Bricton Pneumatic Tires are Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim-cut-proof, Oil-proof and Gasoline-proof. A tire with wonderful resiliency and easy riding qualities.

FREE TRIAL OFFER—To remove any possible doubt concerning the merits of Bricton Tires and to back up our statements fully, we have a **FREE TRIAL** offer at our own risk. The only tire made that offers a **FREE TRIAL**—you can't go wrong. You risk nothing. We take all the risk. Be sure and ask for our **FREE TRIAL** plan when you write for particulars.

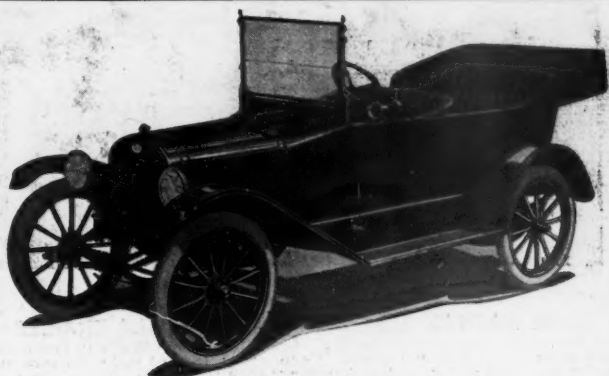
Have Your Present Tires Rebuilt the **BRICTON WAY**—

if you are not in need of new tires and the fabric in your tires is still good, we can rebuild them the Bricton Way, give you thousands of miles additional service and make them Puncture-proof, Blowout-proof, Skid-proof, Rut-proof, Rim cut-proof, Oil-proof and Gasoline-proof.

Write today for full particulars including details of **FREE TRIAL PLAN**.
THE BRICTON MFG. CO.
1265 Bricton Bldg., Brookings, S. Dak.



A
10,000
Mile
Written
Guarantee
with every
Bricton
Tire assures
you of Tire
Economy
you have
never
known
before



METZ "25"

The Quality Car

\$600
Touring Model
Equipped
Complete
Including:
Gray & Davis
Electric Starter
and
Electric Lights

This new Metz Touring Model is just as interesting to DEALERS as it is to prospective purchasers. It means bigger sales, more customers, and ALL of them satisfied.

In addition to complete electric system, equipment includes rain-vision built-in windshield, instant one-man top, heavy tufted upholstery, deep cushions, 32 in. wheels, 3 1/2 in. Goodrich clincher tires, Bosch magneto, Hyatt roller bearings, built-in gasoline gauge, speedometer, signal horn, tools, etc.

We want to hear from Dealers
Write for particulars and New Catalog "K"

METZ COMPANY, Waltham, Mass.



San Diego to New York in 11 Days, 7 Hours, 15 Minutes

E. G. Baker recently made this remarkable time, smashing all records for one-man driving. Read what Baker says about his Basline Autowline:

"I wish to express my appreciation of your Basline Autowline in connection with my transcontinental trip in a Stutz Bearcat. I found use for it several times. One notable instance was in Illinois, where we were mired down. I secured a team of horses, but they would have been valueless had I not had your steel cable. We attached this to the rear of the Stutz, as you see in the enclosed photograph, and pulled right out of the mud. If I were giving advice to tourists I should unhesitatingly recommend the Broderick & Bascom Basline Autowline."

Basline Autowline

is about 25 ft. of one-fourth inch Yellow Strand Powersteel wire rope. Patented Snaffle Hooks at each end make attaching easy and quick. Its great strength makes towing sure. Remember the name when buying—Basline Autowline—and look for the Patented Snaffle Hooks. Sold by all dealers. Price, east of Rockies, \$3.95.

POWERSTEEL TRUCKLINE is the "big brother" of Basline Autowline—heavier, for truck towing. Price, east of Rockies, \$6.50. If your dealer can't supply you, order of us direct.

FREE CIRCULARS. Write for them.

BRODERICK & BASCOM ROPE COMPANY 813 N. 2d St.
 St. Louis, Mo.
 New York Office, 76 E. Warren St.

Makers of famous Yellow Strand Powersteel wire rope

S

Metallic Brushes

—are the highest quality, most satisfactory for use on motor car electric lighting systems. Thorough tests and actual achievement prove SPEER Metallic Brushes superior to others.

Manufacturers—Dealers

It is to your benefit, for profit, to use and handle the brushes that are in public favor. The matter of sales should rule your policy—and SPEER Metallic Brushes are the biggest sellers.

Liberal discounts.

Write for details.

Speer Carbon Co.
 Saint Marys, Pa.



Bull Dog Quality

**Represents the Highest Skill in
Rubberized Fabrics**

Mohairs, Serges and Numotor Fabrics for the best in Automobile Tops, Curtains, Upholstery. Combines the latest modes to please the most discriminating, yet of a quality that the most careful manufacturer is pleased to guarantee.

Send for Samples

L. J. MUTTY CO.
 BOSTON, MASS.

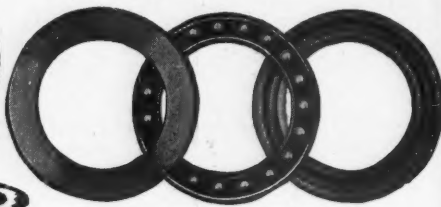
The Bearings Company of America

Sales Department, 250 W. 54th St., New York



RADIAL RETAINERS

MADE IN AMERICA



COMPLETE THRUST BEARING

Manufacturers of Star Radial Ball Retainers, Star Ball Thrust Retainers, Star Complete Ball Thrust Bearings



Make your pleasure car do your light hauling without injury to the car by using

THE SIMPLEX (Short-Turn) AUTOMOBILE TRAILER

Easily attached to any automobile. Light, durable. Trails in the track of the automobile. Will not upset. Costs about 10% of light delivery truck. Can be attached and detached quicker than hitching up a horse. Furnishes a great new field for the automobile dealer. Every pleasure car buyer that needs a light truck is a prospective customer. Write at once for liberal dealer proposition.

THE SIMPLEX SHORT-TURN GEAR CO.

Dept. G, Anderson, Ind.

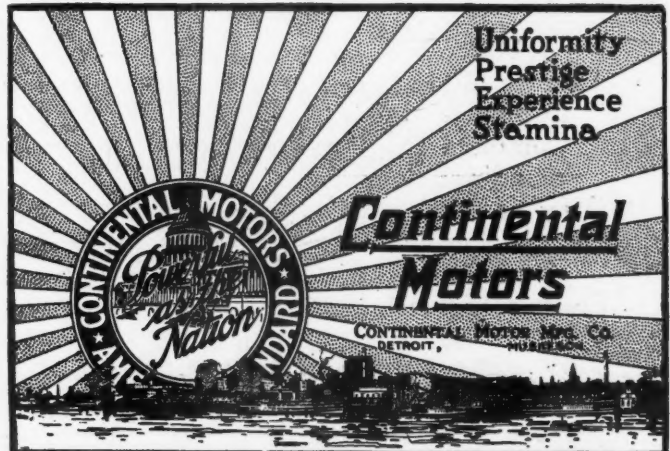
Electric Auto-Lite Starting-Lighting-Ignition

Electric Auto-Lite equipment for automobiles is as famous for the service that backs it as for the reliability and economy of its operation.

ELECTRIC AUTO-LITE COMPANY

Home Office and Factory: Toledo, Ohio

New York Detroit Kansas City San Francisco



Moline-Knight "40"

F.O.B. **\$1475** Factory

40 horsepower, 5 passenger touring and 2 passenger roadster, 118-inch wheel base, 34x4-inch tires (non-skid rears), spiral bevel gear rear axle, weighs 2,896 pounds ready for the road, Auto-Light starter, high tension ignition, complete equipment, 50 horsepower touring, roadster, sedan, limousine models—\$2,500 to \$3,800.

Moline Automobile Co., East Moline, Ill.

Lowest Priced Electric Horn Obtainable

REXO II

\$3.85—Ready to Attach

Guaranteed for the Life of Your Car

THE GARFORD MFG. CO., 2508 Olive Street Elyria, Ohio, U. S. A.



Established Agents Solicited

BRAENDER TIRES and TUBES

are famous for their QUALITY

We wish to announce that irrespective of action by any other organization Braender Quality Will be Maintained

Braender Net Prices to Car Owners

Tires.	Plain.	Non-Skid.	Gray Tube.	Red Tube.
30x2	9.00	10.35	2.35	2.60
30x3 1/4	11.60	13.35	2.70	3.00
36x4 1/2	27.35	31.45	5.20	5.80
37x5	32.30	37.15	6.30	7.00

BRAENDER RUBBER & TIRE CO.

Main Office & Factory, RUTHERFORD, N. J.
New York, 250 West 54th Street
Agents in principal cities

Write to-day for our Territorial Agreement on the

New \$1000

Inter-State "FOUR"

The one popular priced car with the greatest selling arguments in the country.

Inter-State Motor Co.
802 W. Willard St.
MUNCIE, IND.

SPARTON

Hand Horns
NEW PRICE

\$4.00

DELIVERIES NOW

ALL DEALERS

THE SPARKS-WITHINGTON CO., JACKSON, MICH.



The Cornelian Light Car



\$410—Top and Windshield \$25 Extra

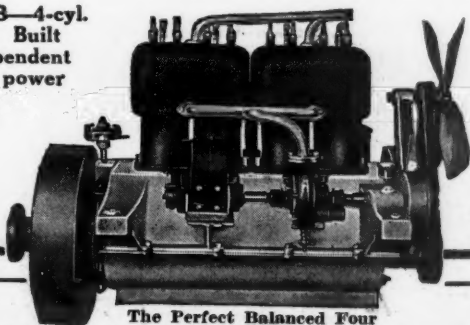
First car to qualify for the Indianapolis 500-mile race, breaking all world's records for cars of its class.

The Car with a Great Future

Blood Bros. Machine Company, Allegan, Mich.

Makers of the famous Blood Bros. Universal Joints.

Model B—4-cyl.
4 1/2 x 5. Built
as independent
or unit power
plant.



4-Cyl.
Models
Model M
4x5
Model B
4 1/2 x 5
Model 11
5x5
Model 12
5 1/2 x 6
Model 12
6x6
6 Cyl. Model
4 1/2 x 5

The Perfect Balanced Four

Been making good for 15 years on pleasure and commercial cars. Special model for Elmore and White Steam cars. Write
BRENNAN MOTOR MFG. CO. Syracuse, N. Y.

BRENNAN MOTORS

SALISBURY

AXLES WHEELS
PROPELLERS

Salisbury Wheel
& Mfg. Co.
JAMESTOWN, N.Y.

Lexington

CRITERION OF ITS CLASS

Thoroughbred Six—\$1875

Minute Man Four—\$1375

Six Supreme—\$2575

Equipped with Moore Multiple Exhaust System

Write for details and co-operative dealer proposition

The Lexington-Howard Co.

18th Street West

Connersville, Ind., U. S. A.

WE NOW OFFER

The Searchlight Welder

A complete outfit for Oxy-Acetylene
Welding

at
\$50.00

High in Quality

Low in Price

Write for complete information to

THE SEARCHLIGHT COMPANY

1016 Karpen Bldg., Chicago, Ill.

Miller Tires



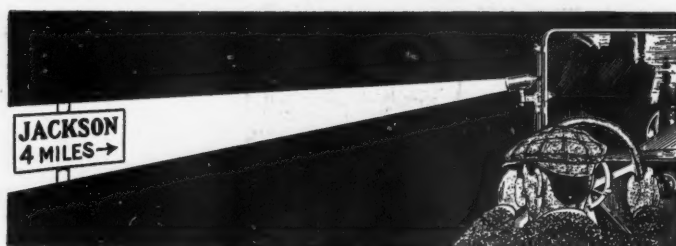
Be the Biggest Tire
Dealer in your Town:

**THE
MILLER DEALER!**

The Miller method of building
Tires means satisfied
Users. The Miller
Method of selling (one
dealer in your town)
INSURES your profit.

Write for our plan.

THE MILLER RUBBER CO., Akron, O.



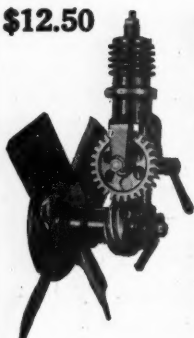
The Pittsburgh Dirigible Searchlight

brings the signboards to you. Gives you a strong beam of light in any direction at any angle.

Needed on every doctor's car and delivery truck for reading house numbers and street signs. Easily detached for use in the garage and as a trouble lamp. Sold by leading supply dealers.

PITTSBURGH ELECTRIC SPECIALTIES CO., Pittsburgh, Pa.

\$12.50



OAKES Fan-Horn and Pump

all three in one assembly—interchangeable with fan on Ford in ten minutes. Simple and efficient. Pumps only when you want to inflate tires. Touch lever—that's all! Finest material—guaranteed.

Horn in Center of Fan

Oakes Beartone horn is motor driven, an integral part of cooling fan. Press button at driver's seat—that's all. Any volume or range needed—instant response, never fails. No gears, batteries, wires, or complicated mechanism. Oakes Fan is the best—outwears the car. Write for full particulars or dealer's proposition.

for FORD THE OAKES COMPANY
Indianapolis, Ind.

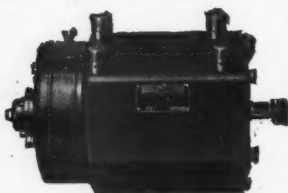


Weight 45 lbs.

The Single Unit Electric Starting and Lighting System. Lighter, yet more powerful than most two-unit systems.

Famous on the Franklin
Write for Catalog and Full Particulars.

DYNETO ELECTRIC CO., Syracuse, N.Y.
Send Us Your Electrical Problems



Corcoran Lamps

GAS, OIL, AND ELECTRIC
CORCORAN LAMP CO.
CINCINNATI, O.

Polarine

FRICITION REDUCING MOTOR OIL

Maintains the correct lubricating body at any motor speed or heat

STANDARD OIL COMPANY

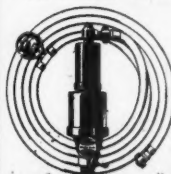
(AN INDIANA CORPORATION)

Hand Pumping Is Just Physical Torture!

But you will enjoy pumping tires with a

MAYO PUMP

Simply substitute the pump for any convenient spark plug. The motor does the work—lets the motorist out.



Price, complete with 12 ft. hose and gauge, \$10. MAYO Q. D. Spark Plug, \$1.50 extra. Try one Free on your car for 30 days.

MAYO MFG. CO.
55 E. 18th St., Chicago



REPUBLIC TIRES

PLAIN, "WM"
AND STAGGARD TREADS

TRADE MARK REGISTERED
U. S. PATENT OFFICE

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No tool needed to seat or remove Valve

Interchangeable with all Stems

Fifty Cents Per Dozen
Single Valves, Five Cents

DOUBLE SEAL TIRE VALVE CO.
1790 Broadway New York City



Actual Size

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\$2

Makes Your FORD Steer Easier
It's much easier to drive your Ford Car, and keep it in the road, with a—

CUSHION TRUSS ROD

Try One on Your Car—Money-Back Basis—It strengthens the radius rods, reduces wear on ball and socket, gives more mileage, makes car ride easier, acts as shock absorber. There's one for you. Get it on your car at once. Price \$2.00. Write for illustrated circular.

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\$4.25
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This is the new warning device that is making such a hit. Screws in place of priming cup and blown by the explosion pressure. Controlled by cable conveniently located for driver. Does not hinder motor. The simplest and most powerful signal made. Absolutely free from trouble and need of adjustment.

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Dealers, Jobbers and Agents Desired.
Our Oregon agent now selling \$850 worth per month.

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Add to Garage Profits by Oxy - Acetylene Welding

Savings made, please your patrons and pay good substantial profits.

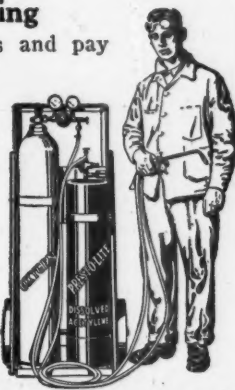
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"K. No. 00 Special" grade for sliding gear transmission
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Reduced prices for 1915. Ask your dealer.

Avoid Substitutes—Look for the orange-colored can with above trademark

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DETACHABLE WIRE WHEELS



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They are lighter.
They are stronger.
The Rims are more easily demounted.
The enamel is baked on.
They cost, enameled black, \$19.75 per set of four spiders, five clincher rims and twenty-four bolts.
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New York State
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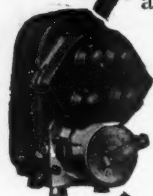
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are superior both mechan-
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Each section
2" wide 1/8"
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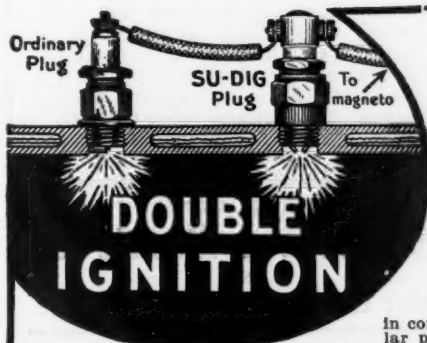
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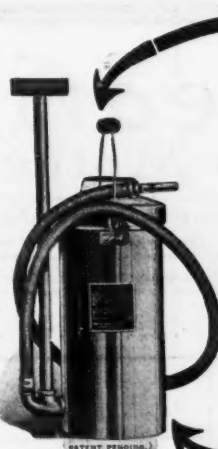
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in connection with your regular plugs.

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—is a convenient container and pump. Operates six times as fast as you can work by hand. Eliminates waste. Made in four sizes. Write for free circular.

Dealers—Big sales. Liberal discounts. No. 75—75 lbs. capacity. Saves money in garages and factories. Write for yours today.

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OFFERS A FINE OPPORTUNITY TO DEALERS

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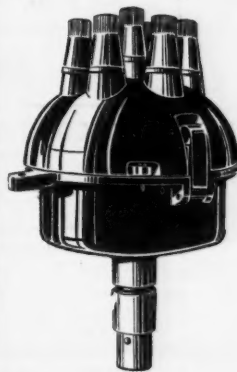
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Have a 40 H. P. 7-passenger, 1912 touring car with long stroke motor and 4-speed transmission which I will sacrifice. This is one of the best lively cars on the market. **CONDON, 2635 Wabash Ave., Chicago, Ill.** Calumet 5311

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Pope Hartford Club Roadster

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None better for speed and power. Address **FORT DODGE AUTO COMPANY** Fort Dodge Iowa

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1911 or 1912 Mercer Speedster, or Roadster Any Condition.

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of practical experience in repair shop of garage, capable of taking charge of same, with force of men under him. Must understand all phases of automobile repairing including magneto work and carburetor adjustments and repairs and all styles of electric starting and lighting systems. A practical mechanic who knows how to use a lathe, shaper and milling machine. Unmarried preferred, although will consider married men. To go to the Orient. Good pay to right party. Address, giving references,

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Complete line of Electrical Accessories. Guaranteed Repair work ON ALL MAKES OF

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Have every other Auto Trade list.
All typewritten, showing financial rating.
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For all makes of cars. Sit right down and write for our samples and price list.
Best Materials. High Class Workmanship
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The Clearing House-continued.

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Carburetors, all sizes, kinds and styles and thousands of other items.	

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32x3½.....	7.50	2.25	35x4½.....	12.50	4.10
34x3½.....	8.00	2.35	36x4½.....	13.50	4.15
30x4.....	8.50	2.85	37x4½.....	14.00	4.25
31x4.....	8.75	2.95	36x5.....	15.00	4.95
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32x3 1/2 ... 4.50 36x3 1/2 ... 7.00 36x5 ... 8.50
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All Fresh Selected Seconds

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32x3 1/2 ... 8.65	2.25	36x4 1/2 ... 18.25	3.70
33x4 ... 12.60	2.90	37x5 ... 21.00	4.50

All other sizes in stock. Non-skid 10% extra.
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There is a big field for **PERFECTION RINGS** and energetic dealers will find them mighty profitable to sell. Write for our prices and discounts.

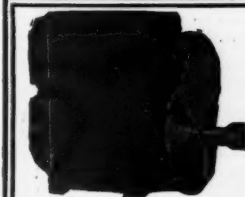
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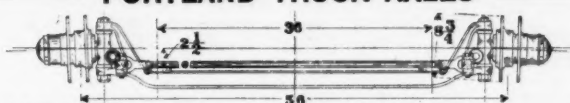
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IT IS GUARANTEED not to stiffen, crack or soften, and to be absolutely waterproof. Tan leather color, russet brown color, dull finished black, olive drab\$6.00

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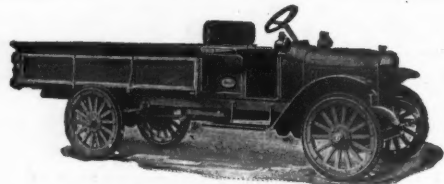
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PERFECT FIT**



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The Fastest Selling Line of Motor Trucks in America

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Stromberg Carburetor	Standard Cone Clutch
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No Better Units Built

We ask the opportunity to prove our statements. Wire or write for catalog and complete information.

Republic Motor Truck Co., Alma, Mich.

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CORBIN-BROWN SPEEDOMETER

"The Speedometer of Absolute Accuracy"

Increased satisfaction comes with the knowledge that no matter what temperature your speedometer is forced to operate, its record will be unerringly true. This knowledge comes only when your speedometer is built on the centrifugal principle. This is a fact that cannot be overlooked. Scientific experiments have proved it true; actual road service has backed them up.

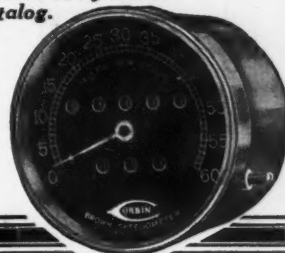
Economy

You can put your tires to a fair test by recording their life on the Corbin-Brown. You can tell exactly how much gas per mile your machine is using by letting the Corbin-Brown keep the record. You can judge the speed and power of your engine by following the hands of the Corbin-Brown. You can plan more accurately your trips and tours, and keep a true diary of speed and miles by taking along the Corbin-Brown this summer.

**Investigate today this centrifugal speedometer.
Sold and equipped by dealers everywhere.
Write now for catalog.**

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THE AMERICAN HARDWARE
CORPORATION, Successor.
New Britain, Conn.

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Makers of Corbin Brakes and Auto-
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Make Worn Cylinders Gas Tight

Why spend time and good money in a practical rebuilding of your old engine when



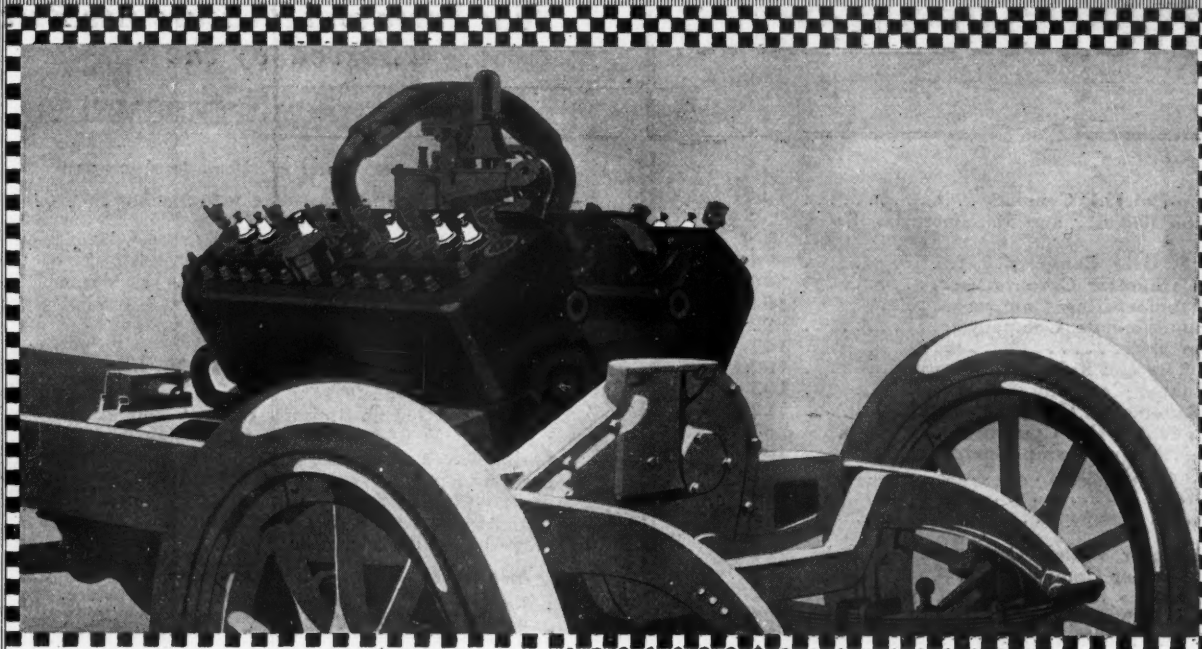
Ever-Tight Piston Rings

"For Leaky Cylinders"

will give it 100% gas efficiency just as it stands? The Ever-Tight piston ring is composed of three individual, interlocking sections, grooved together in such a way as to give great elasticity and at the same time lessen friction. It is the only piston ring built that actually follows the ins and outs of a worn cylinder through the entire stroke. Just the thing to get the very last atom of "go" from an automobile, motor boat, pump or air compressor. Automobile drivers and everybody using gas or gasoline motors, look into this. Maybe you're missing something! Garage Men should write us if their local dealers do not carry Ever-Tight piston rings! Beware of the ring that's "just as good." This is the only perfect three piece ring made.

We want jobbers and dealers everywhere.
Write for particulars at once.

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The Motor of the

Packard "TWIN-SIX"

IT HAS TWELVE CYLINDERS, each of 3-inch bore by 5-inch stroke, arranged in twin sets of six, at an angle of 60 degrees.

It yields the most even torque obtainable in a gasoline motor and thereby provides the greatest flexibility of action possible in a motor car.

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It makes possible a shorter, lighter car, with shorter turning radius, without sacrificing any of that roominess, comfort and luxuriousness, in both open and enclosed bodies, to which Packard owners have become accustomed.

It makes the new Packard master of every situation, whether that situation demands the softest, smoothest, quickest action in town car usage or the fastest getaway and greatest speed in all road driving.

It is shorter and more compact than a "Six" of equal power, yet it

increases activity,
reduces weight,
eliminates vibration,
provides perfect accessibility of all parts.

cuts down up-keep,
saves gasoline,
gives longer service,

Ask any Packard dealer to let you drive the car yourself. The experience will revise your present ideas of motor car sufficiency. The printed matter which is now ready for distribution, upon request, details not only the many features of the "Twin-Six" motor, but also those innumerable car improvements that you naturally would expect in a Packard of new design.

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Contributor to Lincoln Highway



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The Zenith is Europe's dominant carburetor used on six times more different Chassis than other make. Every nook and corner in the world knows the Zenith and three allied factories in three countries

are necessary to supply the better class of motor vehicles.

The Zenith has no complications. It has no valves or springs or adjustments to develop trouble. It is proof against amateur efforts to correct motor faults. Once properly installed it will last almost forever without attention.

These are a few of the Zenith superiorities you need for better results.

ZENITH CARBURETOR COMPANY

CARBURETOR
Detroit-U.S.A.



Charles Y. Knight, Inventor, Says:

"An American producer of first rank will shortly announce a Knight motored car to sell at a price in the neighborhood of \$1,000.

"This producer, after three years of careful preparation, has mastered the problem of building Knight Motors in large quantities.

"And building them equal to the Knight engines of the best foreign makers.

"This achievement will, I believe, convince the public that this type of motor is destined to wholly displace all others among well informed purchasers of motor cars in this country."

